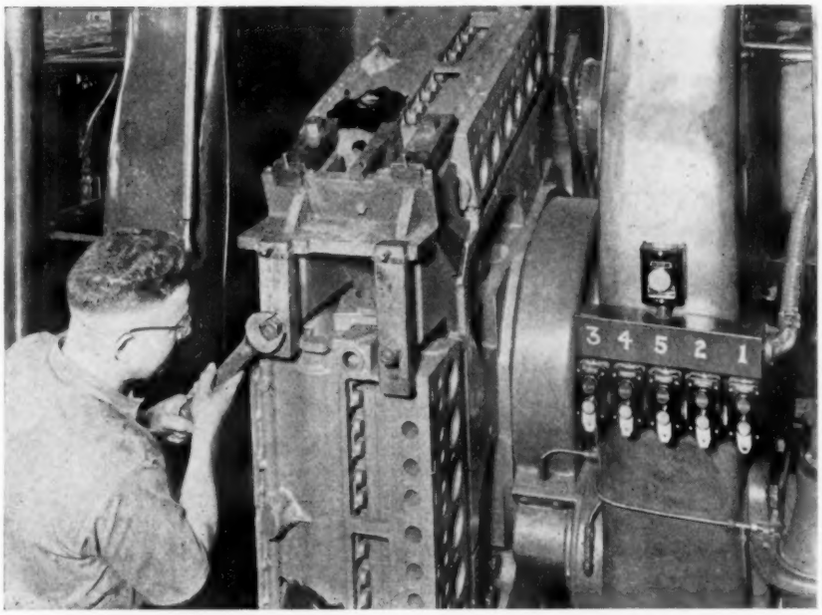
What's in This Issue



Many new machine tools were installed in the new Indianapolis plant erected by International Harvester for making truck engines. See page 915

International Harvester has just completed a truck engine plant at Indianapolis which is **the "last word" in modern equipment.** Pages 915-918 carry the highlights of operations in this new factory. It is a picture story from beginning to end.

How to produce parts from scrap stock with simple press tools is described in detail on page 934. Moreover, line drawings help visualize the job.

Catching errors after a product is completed, or after many parts have been incorrectly processed is costly. The Mills Novelty Company, aware of that fact, employs traveling inspectors who check the work and **make corrections in machine set-ups before mistakes are repeated.** M. G. Monroe tells the story on page 925.

Handling coiled strip steel in presses is no easy matter unless you know how to do it right. C. W. Hinman, in the sixth installment of his series of articles, tells you about **reels and straighteners for power presses.** He mentions types and sizes. See page 922.

A group of railroads is pooling information on **tools and methods for railroad shop operations.** Among other things, the group has made available to its members designs for standard tools. We bring you drawings of a number of these tools on page 920.

Do you know about **Ford's plans for its new Mercury car?** Our Detroit editor gives the lowdown on page 938c.

How much money are metal-working companies **spending on equipment for the safety and comfort of employees?** What results are they getting from such outlays? *American Machinist* made a survey to find the answers to these questions. Look on page 931 for the facts.

"Facts for Foremen" are worth anybody's reading time. They present some straight thinking on **employment, wages and the value of machines.** Turn to page 928 and profit thereby.

Many new products are available for use in metal-working shops. These include machine tools, accessories and materials in a wide range of types and sizes. The **latest offerings are described,** as usual, in Shop Equipment News. This department starts on page 939.

More "Short Cuts for the Small Shop" by A. H. Waychoff appear on page 919. Simple arrangements such as these often help **keep costs within reasonable bounds.**

Two more pages of Time Data Sheets on **handling operations in the heat-treating and cleaning room** are included in this issue. These are a continuation of Parts I and II (*AM*—Vol. 82, page 895.)

Seven crankshaft finishing operations illustrating typical set-ups are shown on page 926. Present day requirements for precision-finished crank bearings and pins emphasize the importance of properly engineered tools and accurate equipment.

COMING

Jigs and fixtures required for the production of the master tools of industry must be planned with somewhat more than ordinary care. When those tools are to be used for the production of a precision jig borer it goes without saying that they must be right. Don't miss the coming article which describes some of the simple tools for operations on parts for a well-known machine.

Watch for an extensive description of improved tooling set-ups on the production lines of the leading automobile manufacturers. This informative story will include many photographs of new equipment selected to aid in making the 1939 models give "more for your money" than ever before.

Simple draw dies for making difficult spherical shapes will be described in another article by Mark Golden, now scheduled for an early issue. The inexpensive tools recommended will draw shells to a large radius without wrinkles.

More practical suggestions for improving employee and public relations will be found in a number of scheduled articles. The next issue will give additional data secured from the recent *American Machinist* survey of 90 companies.

Omega thrives under abuse

THE abusive battering inflicted by pneumatic hammers on chisels, rivet sets, beading and similar tools taxes tool steels to the utmost. That's the kind of service Bethlehem Omega Tool Steel thrives under—the punishment this remarkable tool steel is specially made to take.

An unusual combination of physical properties makes Omega super-shock-resistant and well-equipped to handle the toughest, roughest jobs of all. When Omega is quenched in oil at 1600 deg. F., and tempered at 400 deg. F., a Rockwell hardness of C59 is obtained in combination with a tensile strength of 340,000 lbs. per sq. in. Tempering at slightly higher temperatures further increases toughness, with only a slight reduction in impact resistance. Excellent results are also obtained by quenching Omega in water.

As Omega responds to an unusually wide temperature range and requires no expensive heat-treating equipment, this tool steel is as well adapted to use in the field as in the shop. The uniformly excellent results being obtained with Omega are typical of all Bethlehem Tool Steels, among which can be found a grade for the efficient handling of every tool steel task.

BETHLEHEM STEEL

BETHLEHEM STEEL COMPANY

AMERICAN MACHINIST

ESTABLISHED 1877

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BURNHAM FINNEY, Editor

Instruments of Peace–Not War

MACHINE tools are primarily instruments of peace, not of war. In the world's rush to rearm its military and naval forces, we are likely to forget that important fact.

Lately many orders for machine tools have come from abroad. It should be said that many of them are for equipment to be used in the manufacture of products directly or indirectly connected with military or naval establishments. At the same time, there has been a great slackening in sales to domestic users who ordinarily are the largest purchasers of machine tools. The preponderance of export sales, under the circumstances, has led unthinking and misinformed people to label the machine tool industry as part and parcel of the munitions industry—which is far from the facts.

The truth is that if machine tool builders had to depend on military programs for their business year in and year out, they would starve to death. True, they are always willing and proud to have a hand in America's national defense, but their bread-and-butter business always has been and always will be a peace-time business.

One should remember that machine tools are the master tools of industry. Without their development to a high degree of efficiency, the system of mass production would not have been possible. And if we had not had mass production as we know it today in American industry, the average American would not posses half the things that he does to make life more comfortable for himself and for his family.

Who are the biggest customers of the machine tool industry? The biggest single customer is the automobile industry. And it is the perfection of the automobile and the ability to sell it at a relatively low price that have revolutionized the American way of living and of working. Another big machine tool customer is the farm implement and tractor industry. Mechanization of the farm makes it possible for the farmer to produce more crops at a profit. Another good customer is the electrical equipment industry which is constantly bringing out new products helpful to industry as a whole and to the householder as well. The list could be augmented greatly before one reached buyers who have anything to do with production of "munitions."

FACED with a choice between taking business from a private domestic source for strictly industrial purposes and from foreign countries for either industrial or military purposes, machine tool builders almost to a man would let the foreign orders "go hang." In fact, if the truth were known, the day cannot arrive too soon for most machine tool builders when peace-time industrial bookings completely overshadow war orders.

If wars were abolished tomorrow, the industry would be happy and it would continue to live, as it has through almost all of its history, on its sales to private industry. For machine tools are essentially to be used to manufacture goods to satisfy the normal wants of people. And no manufacturer of machine tools would have it otherwise.

Gaging Business

THE principal developments in the metal-working industry have been on the favorable side. Though machine toool orders dropped slightly to 117.4 in September compared with 120.9 in August, gains are looked for this quarter. Equipment builders would feel more comfortable if a larger proportion of their current business was of domestic origin. Plants with large export orders are the busiest. Government purchases in connection with national defense measures are expected to become an increasingly important factor in equipment buying.

Government awards for machinery, materials and supplies to metal-working companies during the week ended October 8 totaled $5,067,713. Steel mills, partly bolstered by sizable automotive releases, are expanding production slowly. Motor car makers are plunging into an impressive program for stocking dealers with new models. Advance sales of '39 cars to retail buyers have been unusually good and the backlog of unfilled orders is large.

NEW ENGLAND—Machinery orders reflect revival of operations in the automobile industry and improvement in general manufacturing. Government business looms large in current inquiries. Heavy steel purchases for bridge reconstruction are expected in connection with recent hurricane damage. Much textile machinery is being rehabilitated or replaced as a result of the hurricane.

NEW YORK—Equipment sales continue on the upgrade. A large amount of government business should be closed shortly. Export demand is active. Philadelphia reports machine tool sales are on the mend.

PITTSBURGH—The steel rate has risen above 50% and is likely to continue slowly upward. However, the slash in sheet steel prices has tended to nullify optimism over expanding sales. Pittsburgh business the past month has been at the highest levels since last December, according to the University of Pittsburgh's Bureau of Business Research. Equipment orders are slightly better.

CLEVELAND—Machinery inquiries have increased notably, but sales to domestic buyers lag. Equipment builders look for slowly increasing volume the next 60 days. Companies having a backlog of export business are operating fairly well. Steel mills are running about 50%. Auto parts companies are adding to working hours.

DETROIT—Machine tool purchases are expected to be small except for fill-in orders from automobile companies. The amount of such business won't be known until car makers ascertain what public reception their new models will get. The supply trade is quiet. Equipment sales at Toledo are gaining slowly.

CINCINNATI—A pick-up in domestic sales of machinery is reported by several important builders, orders having come from widely diversified fields. Some new export business has also been placed. Companies without much support from foreign buyers are operating on relatively lean schedules.

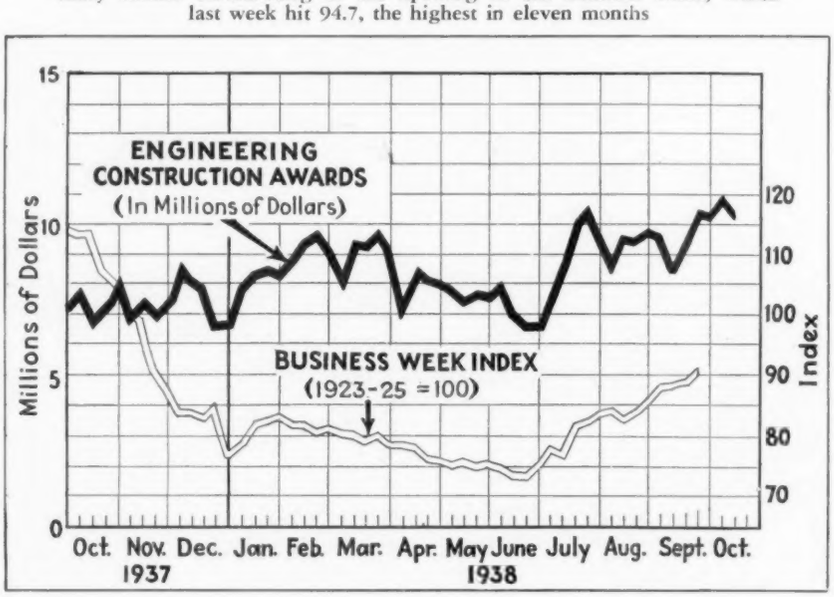
CHICAGO—Steel output has advanced to the highest point of the year, supported by a general increase in demand and by heavier automotive releases. Price reductions in tractors and farm machinery are counted on to stimulate sales to farmers who have been hit by the low price of grains. Tractor makers say that industrial sales are better. Construction equipment builders, except those with foreign bookings, have had a poor year and are going into their dull season.

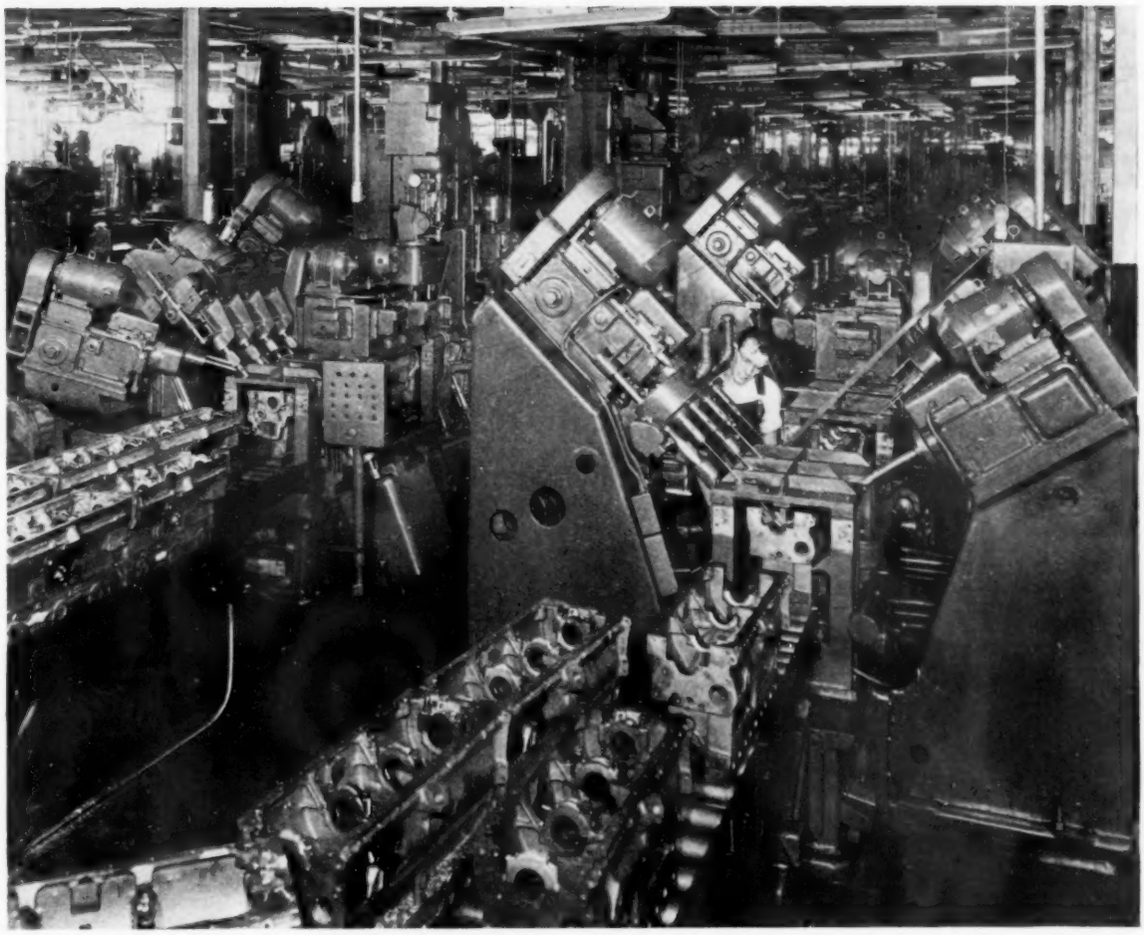
MILWAUKEE — Employment has turned up for the first time in a year. Principal gains come from companies making machine tools, household appliances and automotive parts. Nash expects payrolls to increase gradually to 3,200 to Kenosha, 2,000 in this city and 300 at Racine. Assembly work at the West Allis tractor plant of Allis-Chalmers will start around December 1.

SAN FRANCISCO—Machine tool orders ae 10% larger than in the preceding fortnight. The bulk of equipment purchases has been to governmental agencies. The shipbuilding outlook is gloomy, yards here being likely to get orders only after Eastern yards are full. The 6% differential in prices favoring Pacific Coast yards does not begin to match the extra cost for freight on materials and for skilled men.

CONSTRUCTION AWARDS VS. GENERAL BUSINESS

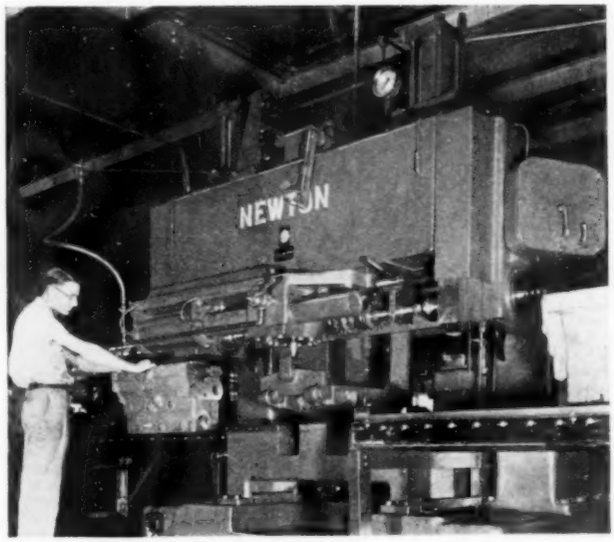
The graually increasing volume of engineering construction is one of the many factors contributing to the upswing of the business index, which last week hit 94.7, the highest in eleven months





All miscellaneous cylinder block holes are drilled and tapped in two W.F. and John Barnes three-station machines. The work is automatically indexed and clamped at each station. Spindles advance at rapid traverse, feed and return to position. Should one clamp or spindle fail the entire machine stops to prevent work spoilage or damage to the equipment

International at Indianapolis



A Newton rise-and-fall milling machine straddle mills the sides of main bearings and cuts the lock slots. The conveyor is at the same level as the fixture; work is elevated to the cutters, clamped pneumatically and returned to the conveyor automatically

INTERNATIONAL HARVESTER has taken a long step in factory expansion and Indianapolis has gained a new industrial unit in the recent opening of the International Truck engine works in that city. The plant has a present production of 680 truck engines daily with provision for a potential of 2,000 engines. Floor areas are 363,000 sq.ft. in the manufacturing building, 260,000 sq.ft. in the foundry and a power plant adding to the total.

Buildings are of single-story construction based on studies of International Harvester engineers who found savings in material handling and in floor space by the elimination of elevator and stair wells. Bays 22 x 33 ft. provide two or three ma-

chine aisles and adequate space for material moving and storage.

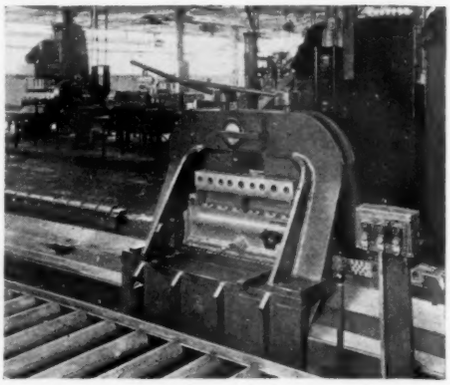
Saw-tooth roofs are used, with toilet, shower and locker rooms placed penthouse style above the bottom chord of roof trusses.

Two basic types of engines are manufactured at Indianapolis in two parallel manufacturing and assembly lines with a 20-ft. aisle between them. Parts production lines at right angles to the assembly lines are placed to feed stations where sub-assemblies join the main assemblies.

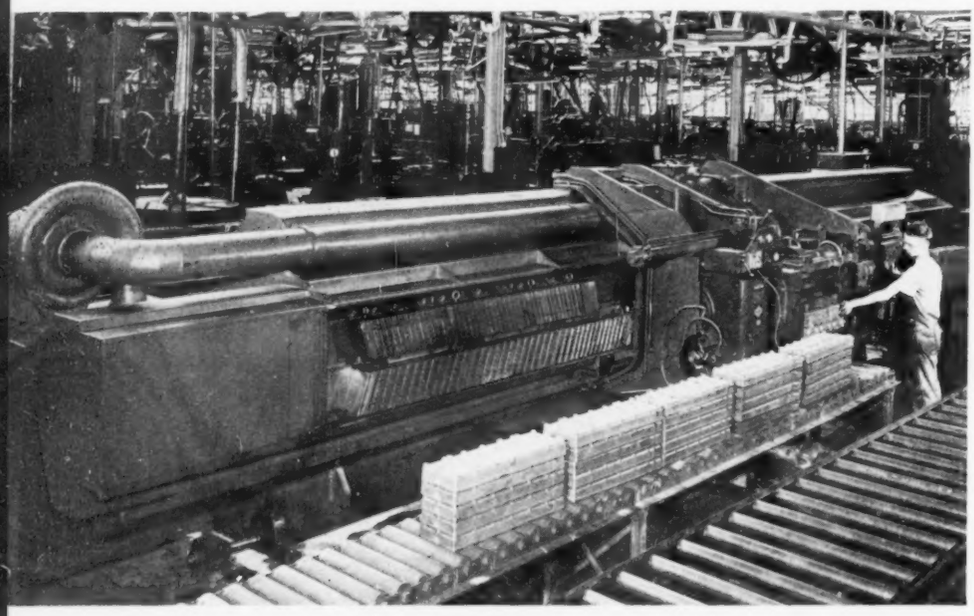
Six separate trolley conveyor systems in the manufacturing building total over 8,000 lineal feet and carry 3,000 hooks. The largest conveyor, used for delivering materials from stores, extends a little less than half a mile and may be varied in speed from 16 to 48 ft. per min.

Trolley conveyors clear aisles and machine lines, dipping where needed for loading and unloading. Thirty Cleveland tramrail systems, both monorail and crane types, have been installed.

Shown on these pages are some of the more interesting machine operations now in use at this modern plant.

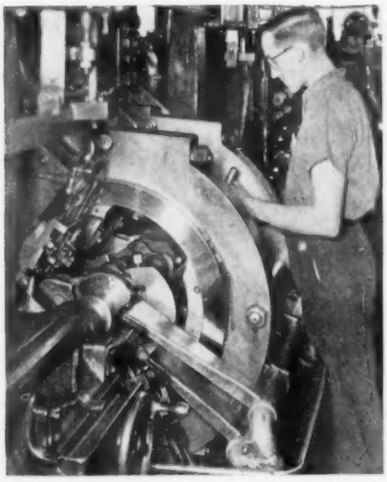


Crankshaft bearing half bores and main bearing cap seats are machined in the cylinder block by a special Cincinnati horizontal broaching machine. This method insures accurate alignment, gives close control of size and finish

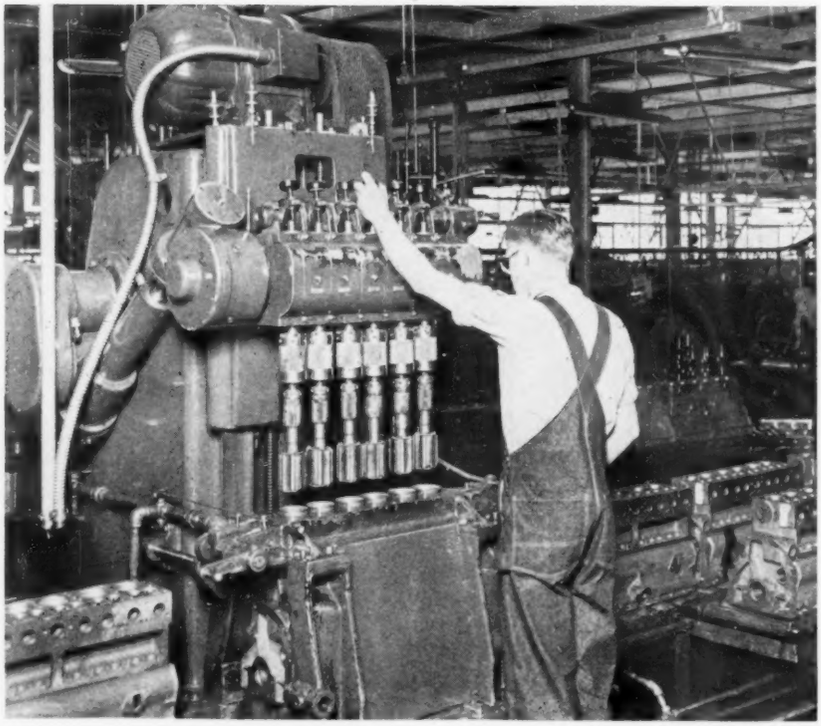


Top and bottom of cylinder heads are broached in a single-ram Cincinnati machine. A power operated four-position index fixture is loaded while the machine is in operation. Electric eye control prevents machine motion if the casting is misaligned in the fixture or has too much stock. The top of one cylinder head and the bottom of another is machined at each stroke. During the return stroke a hydraulic ram pushes a completed head out of the fixture and a half finished one into a transfer cradle

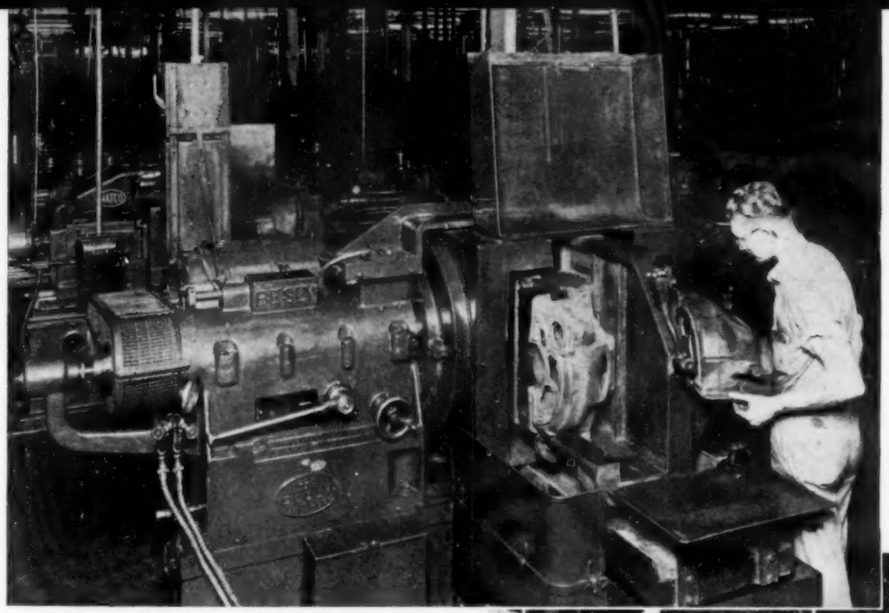
A six-spindle Moline boring machine gives mirror finish and accurate size to the cylinder bores



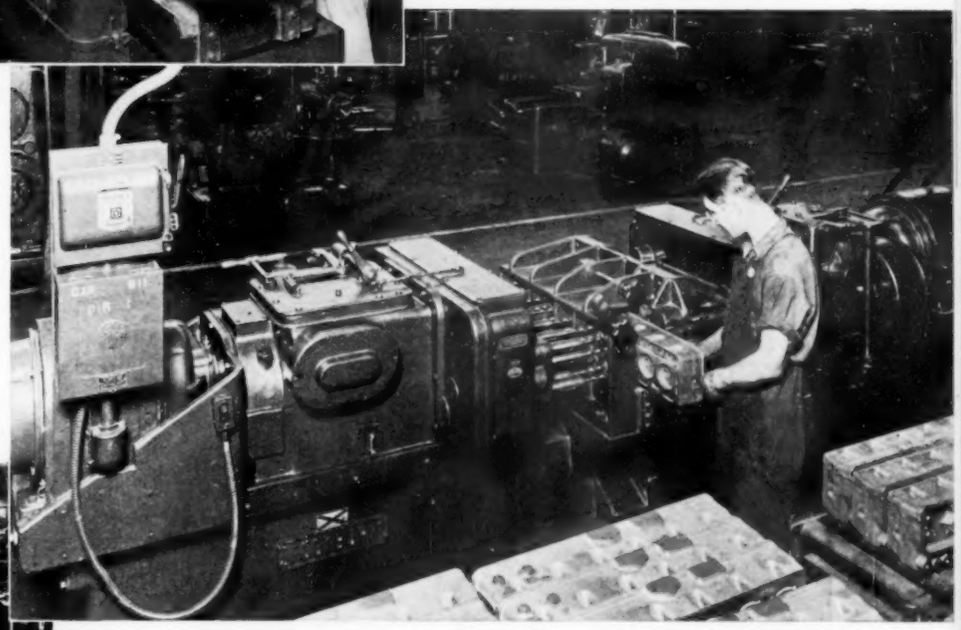
An unusual view of a Le Blond crankshaft lathe shows the tool set-up for turning and facing all main bearings simultaneously. From this machine the work goes to the latest two-station type of crankpin lathe. All pin and main bearings can be finish ground from these turning operations



INTERNATIONAL AT INDIANAPOLIS

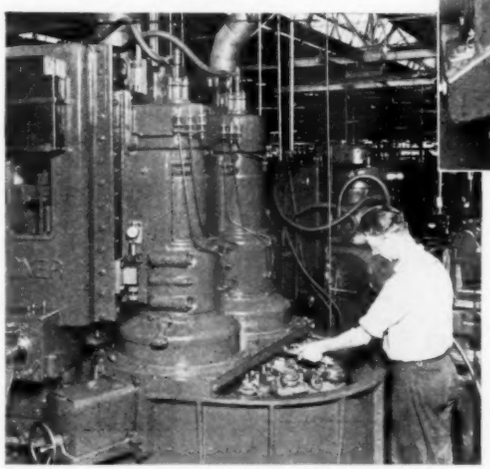


A Foote-Burt two-way machine drills all holes in the top and bottom of the cylinder head, including the cylinder head stud holes. A fixture designed especially for the purpose provides accurate sizing spacing

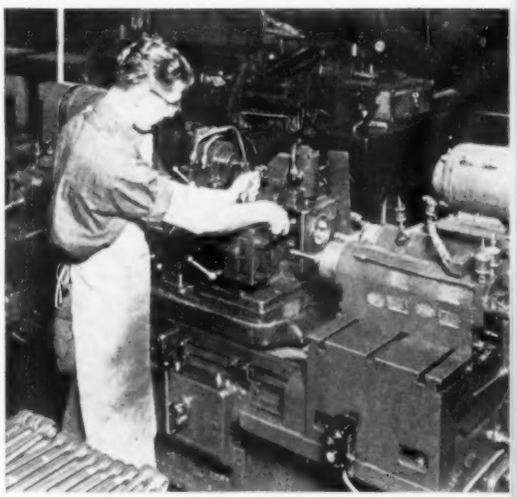


Front and rear of the flywheel housing are surface ground from the rough on a Besly double-end machine. The transmission contact face is finished after assembly to the crankcase in order to assure alignment of the transmission and motor

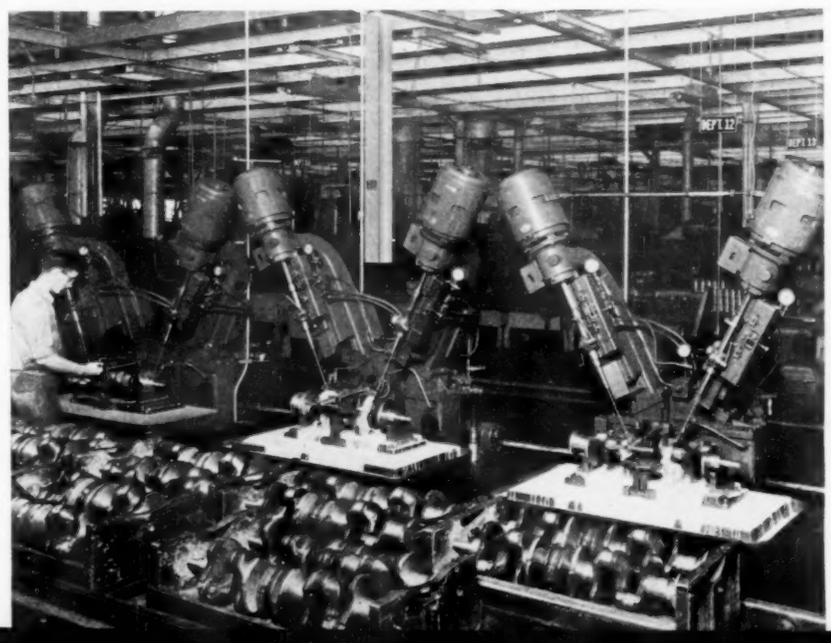
Crank bearing ends of the connecting rod and cap assemblies are roughed and finished in a Gardner double-wheel surface grinder. A multi-station rotating fixture carries the work



Leland-Gifford hydraulically operated machines drill crankshafts for the oil holes from the main bearings to the connecting rods. Holes $\frac{1}{4}$ in. in diameter and 7 in. long provide for the force-feed system of lubrication



This is one of a battery of Ex-Cell-O double-end machines which precision bore the large and small ends of connecting rods. Hydraulically operated fixtures give quick loading and unloading



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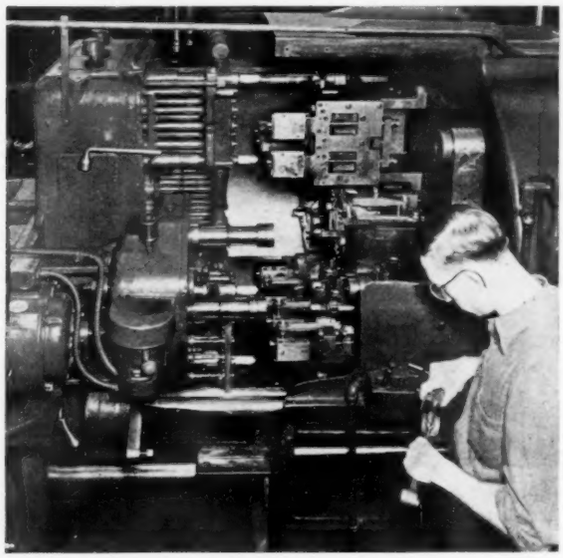
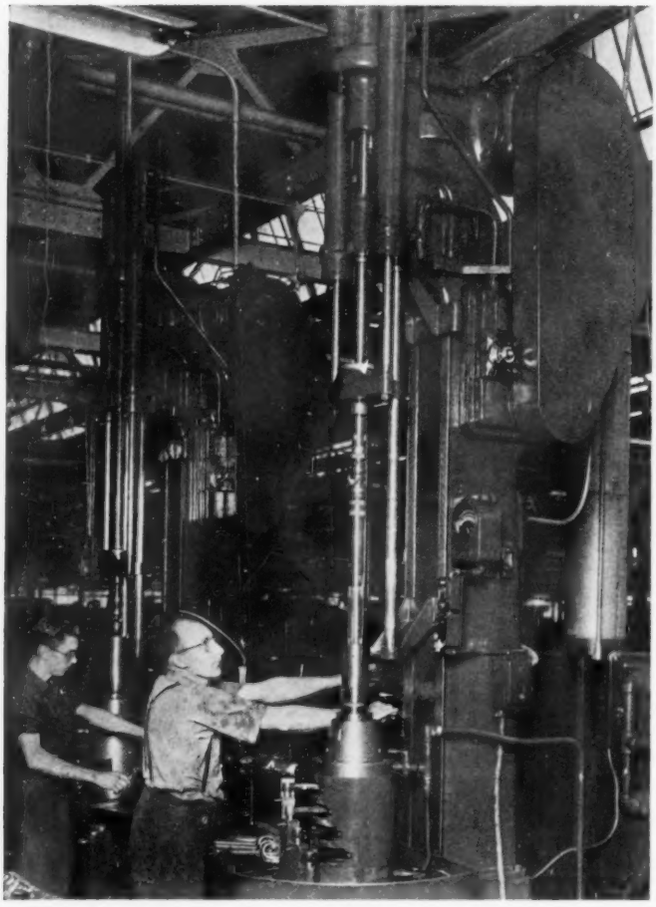
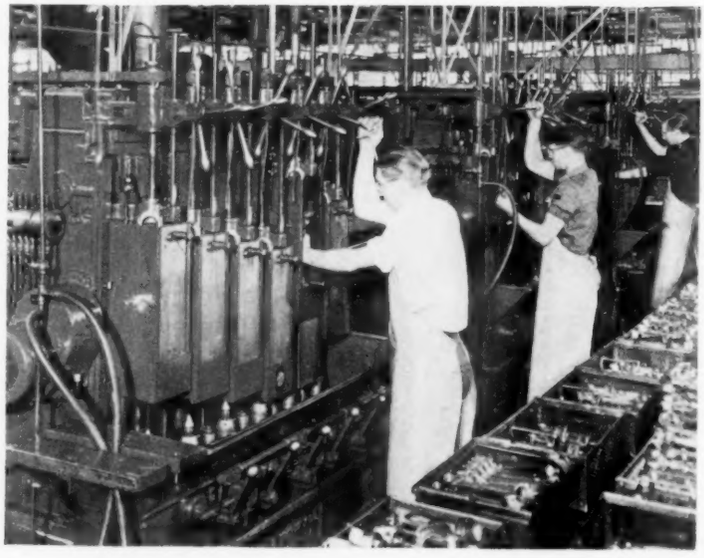


A massive fixture holds rods and caps in several positions while the bolt holes are drilled, counterbored and spot faced. The machine is a Greenlee, built specially for this service



Four connecting rod and cap assemblies are held at one time in a fixture on a Barnes boring machine. International Harvester uses two such units in the Indianapolis plant



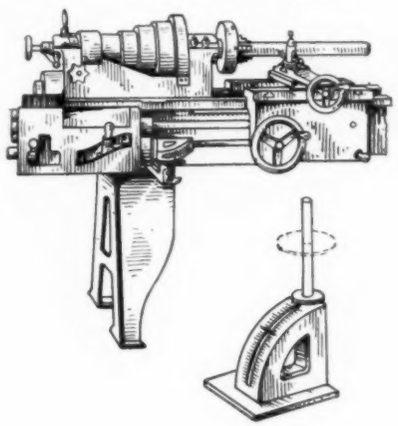
Pratt & Whitney machines riffle drill a 3/16-in. oil hole the full length of the connecting rod. These machines drill and free the tool of chips automatically. Operators load and unload one fixture while five others are operating

SHORT CUTS FOR THE SMALL SHOP

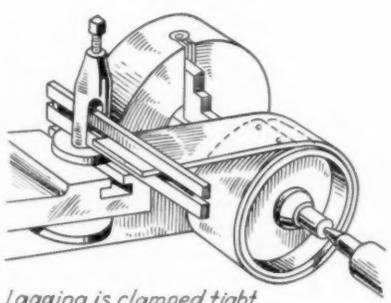
A. H. WAYCHOFF

Better than the common custom of putting a C-clamp on the lathe ways or bed to act as a stop gage is the idea shown in the drawing. The platform is removed from a small scale like those used for weighing letters and a short rod welded to the plunger. The scale may then be clamped to the lathe bed so the apron of the tool carriage will come against the rod. A glance at the pointer will show plainly when a certain place on the work has been reached with the tool, thus saving considerable time on many jobs

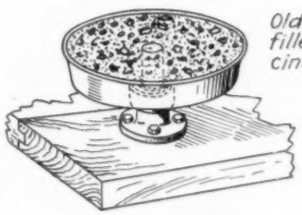
Pointer on an old letter scale shows exact point to stop cut



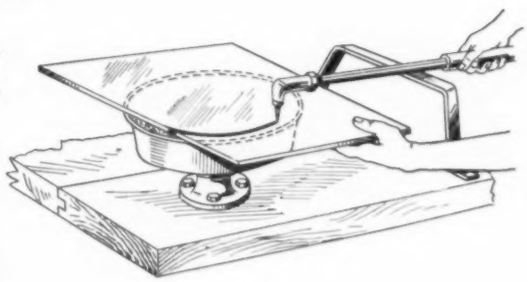
When necessary to lag pulleys it will be found that a good job can be done easily and quickly by the following method. Key the pulley on a piece of shaft and chuck in a lathe. Attach one end of the lagging at about the top of the pulley, wrap it around the pulley and clamp between a couple of bars held in the tool post. With the tool post bolt screwed down tight on the bars, lock the lathe with the back gear and then back off the carriage screw and the lagging will be drawn skin tight for the riveting

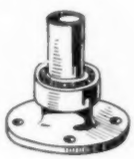


Lagging is clamped tight by bars in tool post



Old auto disk wheel filled level with cinders





For cutting circles from boiler plate and other steel one welding shop uses an old auto disk wheel turning on ball bearings. They say it's a lot better than many other devices they have tried. To make it, bolt a 2-in. pipe flange to the bench and screw a short length of pipe into it. An old thrust bearing is slipped on the pipe, and the wheel is then placed on the bearing. Bend a piece of strap iron to make a rest for the torch and bolt it to the bench far enough away so the corners of the plate being cut won't hit it. After the wheel is filled with cinders, it is ready to use. This shop cuts many disks for the ends of welded tanks, pipe ends and the like with such an arrangement

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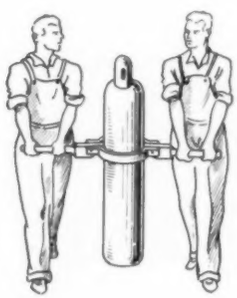

Anyone who's ever had to move oxygen or other gas cylinders around the shop knows what an awkward job it is. A mighty convenient carrier for these tanks can be made from scraps usually found lying around any shop. A couple of pieces of strap iron are bent to a half circle about the same diameter as the tanks, then the ends are bent outward and holes drilled through the pair of them. Two hardwood handles are shaped as shown, taking care to see that the length from the big ends to the holes is just right to clamp the cylinder good and tight. These four parts should be put together with big bolts, since the jamming action puts a lot of strain on them. They ought to be a snug but not a tight fit, so the carrier can be slipped on and off the tanks with the handles swung down. With this easily made device it's a cinch for two men to carry a cylinder, and even one can do it a lot easier than he could by wrestling with it the way most fellows do

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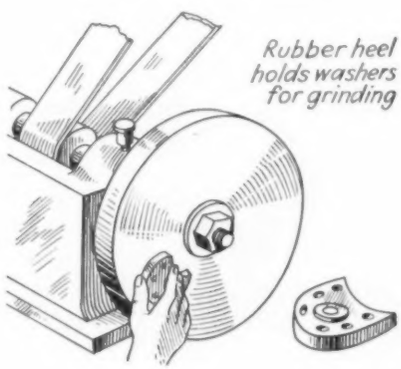
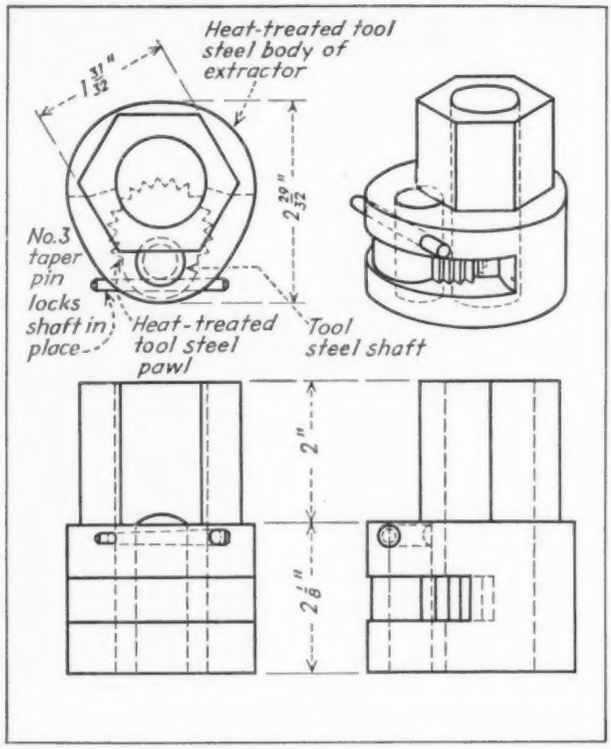
Many times the need arises to grind down the face of a washer, nut, shim or other thin piece, and holding these small parts for grinding is usually sort of a problem. A handy trick is to use an old rubber heel for pushing the washer or other object against the wheel. A slight pressure will bed the washer into the soft rubber and hold it from slipping, in this way doing a good job of the grinding



Rubber heel holds washers for grinding

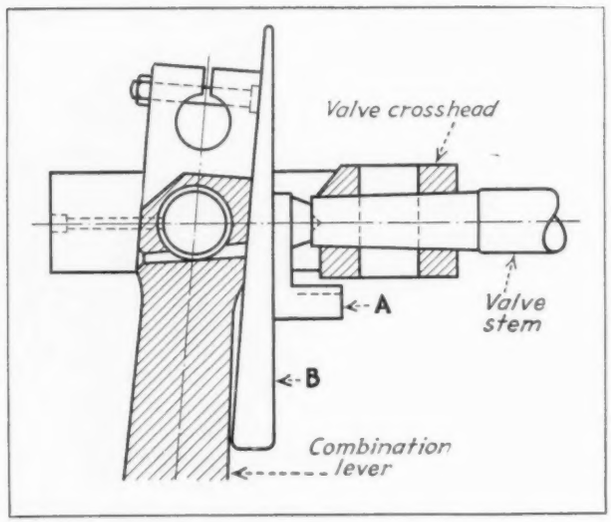


STANDARD TOOLS for

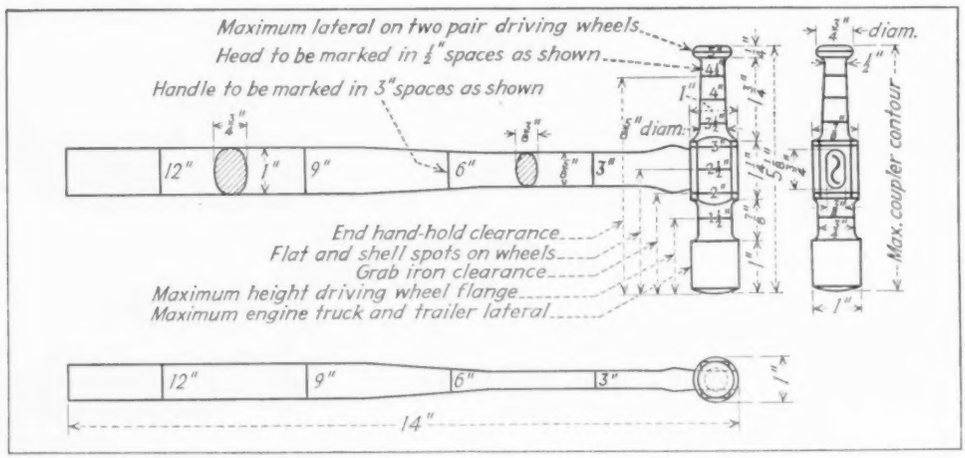
THE interchange of information as to tools and methods required for various railroad shop operations, made possible through the appointment of a joint Mechanical Advisory Committee, is resulting in a series of designs for standard tools. Drawings of these tools are available to the various shops of the cooperating roads. These include the Chesapeake & Ohio, the Erie, the New York, Chicago & St. Louis and the Pere Marquette railroads. Use of these designs, and others in the series, has effected material economies as a result of using tools especially designed for given operations, and also as a result of reduced design expense.

This and a following article, published through the courtesy of the committee, shows a number of these tools

Tightly driven studs frequently are difficult to remove. This stud remover, one of several designs that have been approved, has been adopted by the shops of several of the roads. The heat-treated, tool steel body of this unit has a long hexagon extension to provide a fit for the wrench. At the other end there is an enlarged portion that carries a notched eccentric, which also is made of tool steel. This 16-toothed eccentric swings freely on a tool steel pin and the hardened teeth dig into the stud when the extractor is turned with a wrench. The stud has to come out—or break off, which seldom happens



Taper fits have a way of sticking in place, even after the key is removed. A simple method of forcing valve stems out of their crosshead fit is provided by this tool now in regular use in several railroad shops. The block *A* carries a center which locates it on the end of the valve stem when the block is slipped into the opening between the end of the stem and the combination lever. For this operation, the lever is disconnected and tipped up as shown. With the block in place, the wedge *B* is driven in to force out the tapered end of the stem

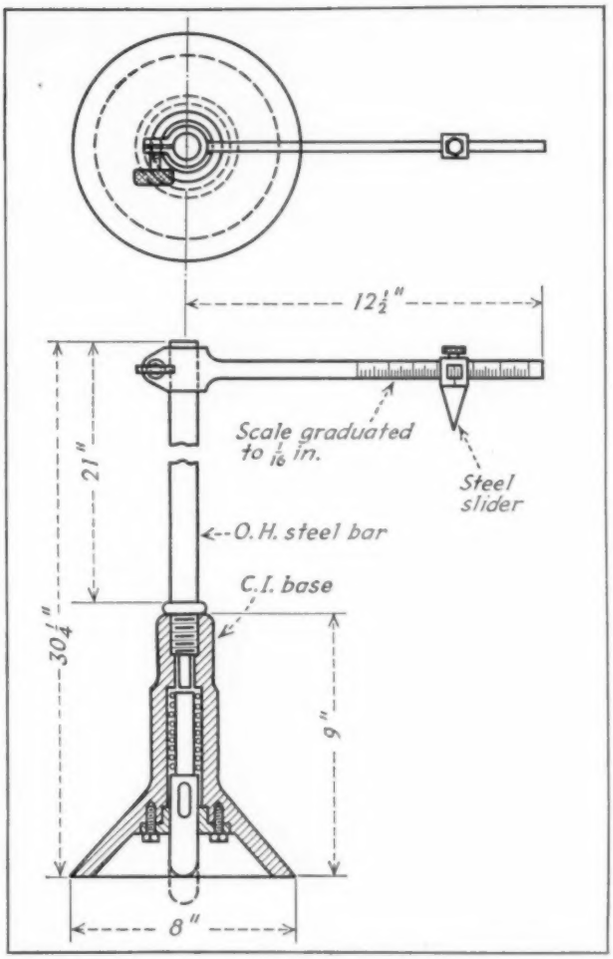

Maximum lateral on two pair driving wheels
Head to be marked in ½" spaces as shown
Handle to be marked in 3" spaces as shown
12"
9"
6"
3"
End hand-hold clearance
Flat and shell spots on wheels
Grab iron clearance
Maximum height driving wheel flange
Maximum engine truck and trailer lateral
Max. coupler contour
14"

This hammer has been designed especially for use by locomotive inspectors. The head is of 0.75-0.85 per cent carbon steel and both the head and the handle are graduated as shown. These graduations all have their use; the diameters of both ends having been selected for use as "no go" gages for laterial tolerances, as indicated

RAILROAD SHOPS—I

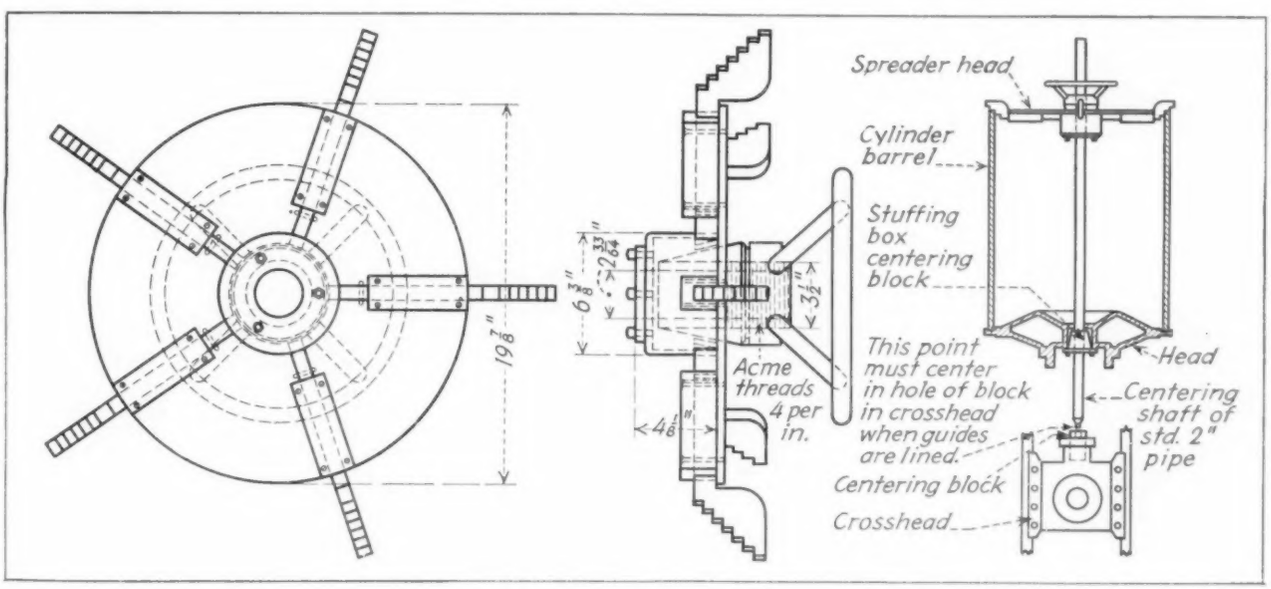
and accessories and indicates the extent to which the program is being carried. It is probable that a number of the designs shown will have application, in principle at least, to the production and maintenance departments of metal-working shops making a wide variety of products.

Just as the standardization of many of the tools supply parts used by the industry have resulted in major reductions in manufacturing expense, the development of a standard tool designs for particular operations should improve both manufacturing and maintenance methods. This is particularly true where full analysis of the requirements is made before the final design is approved, as was the case with the tools shown.



The gage shown has proven particularly suitable for setting the eccentric motion crank arms of Walschaert, Baker and similar valve gears in proper location with relation to the main crankpin. Cast-iron base of this gage is held against the end of the driving axle with the round-ended, spring-actuated plunger in the center of the base located in the driving axle center. With the graduated arm in the proper location and the pointer at the correct setting on the graduated scale, the crank arm is swung on the crank-pin until the pointer and pin center coincide. Fastening the crank arm at this point insures proper setting to give the desired movement to the valves

There are several methods of lining the crosshead guides with the cylinder bore of railroad locomotives. It was customary at one time to run a wire through the center of the cylinder and line up from that. The device shown insures more accurate results and effects a considerable reduction in the time required for the job. This tool consists primarily of a centering plate for the front end of the cylinder, a conical centering block for the stuffing box end, a ground shaft that is guided both in the centering plate and in the centering block, and a second centering block that fits in the tapered piston rod hole in the crosshead. The centering plate is fitted with five stepped jaws which are adjustable so that the unit will fit into any cylinder. A large diameter cone bears on the inner ends of the jaws and forces them into contact with the cylinder wall when operated by the hand wheel. With the centering plate in place the centering shaft is pushed through both bushings and out between the guides



PRESS WORKING OF METALS • NUMBER 6

Reels and Straighteners For Coiled Strip

These auxiliary devices for power presses are available in several types and many sizes to suit the material and the method of feeding

C. W. HINMAN
Tool Engineer
Kobzy Tool & Electric Mfg. Company

Fig. 24—Most plain stock reels have an adjustable core diameter, and the reel arms are adjustable for various widths of strip

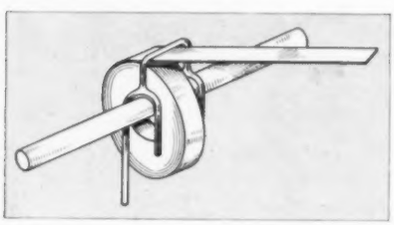


Fig 25—In this simple reel, double hairpin forks guide the unwinding strip, the coil being supported by a pipe

ECONOMICAL press-shop operation depends in large measure on the materials-handling methods in use. Where quantities are produced in automatic set-ups it is imperative to have the right kind of devices for holding coils of strip stock while it is fed to the dies. And it is frequently necessary to add straightening devices to remove the curvature found in tightly wound, springly materials or to remove kinks. For these reasons a variety of coil reels, coil cradles and strip straighteners are available.

Plain Stock Reels

Plain ball-bearing stock reels are built in several sizes and types. There are both single and double reels designed for holding one or two coils vertically at one time. A popular type of single reel is illustrated in Fig. 24. Such reels are designed for taking coiled strip from the narrow widths up to 10 in. wide. For wide strips and heavy thicknesses, a "coil cradle" is used.

These reels are adjustable to suit various coil core diameters, and are equipped with brakes to prevent "whipping" and "overthrow." They are suitable for flat or round stock. Such reels are arranged for vertical or horizontal operation, or at any intermediate angle. They are also adjustable in height.

Reels are usually placed with their bases on the floor, and at the side of the press from which the strip is fed. Some manufacturers find it advantageous to place the reel base overhead, and thus use the reel in reversed position. This allows extra space around the press, and floor space is at a premium in the average press room.

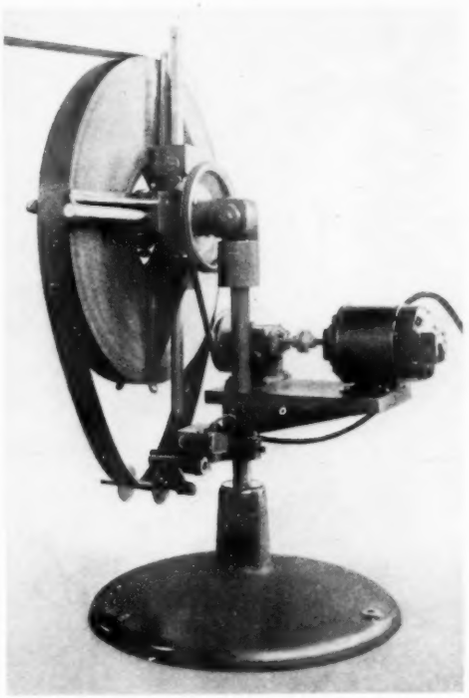
A Home Made Reel

Fig. 25 shows a "home made" reel for light coiled strips. This idea has been successfully applied by small manufacturers. The coil is supported on a pipe resting on two wooden horses. Double "hairpin" forks are placed over the coil to prevent the strip from running wild when unwinding..

When light or medium heavy strip is run from a stock reel to the dies, a limit switch can be secured on a bracket attached to the side of the press. The strip is arranged to pass over, or under, a roller on the switch. The weight of the strip, or the pull of the feed, holds down the electrical contact that controls the motor and press. When the end of the coiled strip leaves the reel, and reaches the roller, the switch arm is released and the press stops automatically. When one operator tends several presses, this arrangement is of considerable advantage. It prevents the strip end from entering the dies and causing half cuts and sheared, or nicked, cutting edges.

Automatic Reels

Motor-driven reels are made in several sizes and types. Some of them will handle stock up to 12 in. wide. They are built for vertical coils, as shown in Fig. 26, for tilted positions of



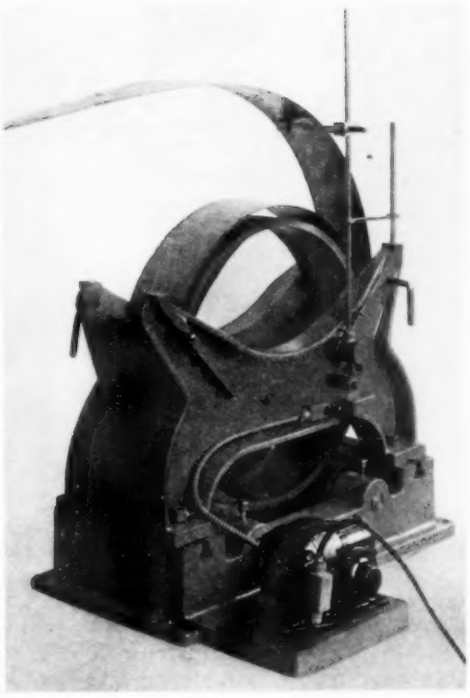


Fig. 26—Greater economy in feeding is secured from an automatic stock reel, particularly where heavily loaded reels are operated and long feeds are run at high speed

Fig. 27—Large, heavy soils, as now used in many metal-fabricating plants, are best handled by a coil cradle, which is loaded by a hoist or by rolling the coil up an incline

Fig. 28—Heavy strip is unwound by a pair of power-driven rolls in the coil cradle and delivered to a power-driven straightener

the coil, and for horizontal coils. Automatic reels are designed to maintain a loop of the strip between the reel and the unit to which the strip is delivered.

These reels are motor driven through suitable speed-reducing gears. The motor is controlled by the position of the loop. The strip passes under a roller on a tilting mercury switch, which maintains a loop of the proper size. The switch operates the motor and reel intermittently, and only when more strip is required for the dies. Accurate feeding is assured by this arrangement, because whatever type of feeding is employed, the feeding mechanism is never required to pull the strip or operate the reel. Strain on the strip is also entirely eliminated. The mercury switch with its attached arm and roller, under which the strip passes, is seen in the foreground just above the base.

Coil Cradles

There are two types of coil cradles. In one, the rollers are motor driven, while the other is equipped with a single-roll power feed which actually pulls the strip. In either case, the coil cradles are adjustable in width, and the coil is motor driven intermittently by the use of a mercury switch in connection with looping the strip under a roller on the switch arm, as described previously.

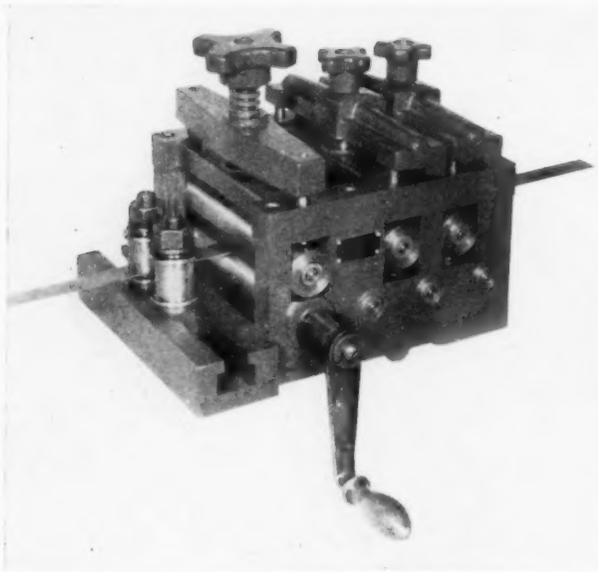
The first type of coil cradle, shown in Fig. 27, is used for relatively wide stock, and for heavy thicknesses. It readily handles coils up to 72 in. wide, weighing 6 tons. The two driving rollers shown under the coil are connected with a chain drive across the back of the machine.

Fig. 28 is a view of the other type of cradle set up in connection with a power-driven straightener. The strip shown is steel, 12 in. wide by $\frac{1}{4}$ in. thick. In this case, a single pair of rolls, at the far end of the machine, pulls the strip and cause the coil to revolve on its supporting rollers while unwinding.

Both the coil cradle and the straightener are power-driven and equipped with the usual mercury-switch control. In operation, the crade maintains a loop of stock for the straightener at all times. This is done by means of a mercury switch control which starts the motor and revolves the coil when the loop decreases. A similar control is attached to the straightener which maintains a loop in the straightened stock between the press and straightener. A roll feed mounted on the press, not shown, takes the stock from the loop presented by the straightener. When this loop diminishes, the straightener control starts the motor and thus provides a new loop. This equipment is in use by a large automobile manufacturer.

Vacuum-Cup Lifters

A comparatively recent development for lifting large stampings above the strip to prevent interference when the coil cradle feeds the sheet, operates as follows. Soft-rubber vacuum tips are attached to the press ram and on the down stroke engage the blank



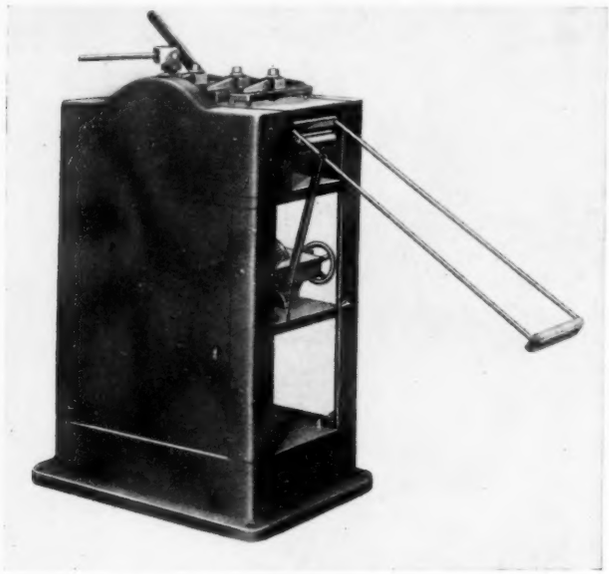


Fig. 29—(*Left*) A plain stock straightener is the most economical device to use when the feed rolls have enough power to pull the flat strip through the straightening rolls. Fig. 30—(*Right*) Power straighteners feed a loop of strip to the feeding rolls, the loop being controlled by a mercury switch

by suction. Each of the tips has a hose connection leading to a vacuum pump atop the press. When the ram ascends the tips lift the work, leaving the die open for feeding. At the top of the stroke the vacuum is automatically released and the stamping drops down for hand removal. This installation is used in blanking front fenders for automobiles and for other large work.

Plain Straighteners

The simplest stock straightener for coiled strips is shown in Fig. 29. The strip passes through the straightener, which is placed between the stock reel and feeding rolls on its way into the press and dies. A good straightener insures perfectly flat strips for the die operations. This particular straightener is not power driven; the strip is pulled through it by the press feed. It is made in seven sizes having five to nine rollers, and for strips up to 8 in. wide. The upper rollers can be individually adjusted, and are designed to equalize across the strip.

Power Straighteners

Operation of the rollers in power straighteners, Fig. 30, is similar to those in plain stock straighteners. These straighteners are intermittently power driven through a loop in the strip that passes under a roller attached on the arm of a mercury switch. All the lower rolls are power driven. The top rollers are individually adjustable, and provision is made for starting a new strip without disturbing the adjustments. The upper rolls are designed to equalize across the strip. A variable-speed control regulates the advance of the strip. These straighteners are built in several sizes and will take coils up to 12 in. wide and weighing 6 tons.

Two-Way Straighteners

A double straightener, shown in Fig. 31, is adapted for straightening round, square or flat wire, or the equivalent. It consists of two sets of straightening rollers, one set being vertical and the other horizontal. All rollers are equipped with oil cups and individual adjustments.

Stock Oilers

The stock oiler, shown in Fig. 32, handles stock up to 8 in. wide. Strip passes between two felt pads saturated with oil furnished from a top trough and supplied by the tank. The strip edges are guided between two adjustable rollers shown at the front. The height of the device can be adjusted.

Acknowledgments are gladly given to the following companies for illustrations used: E. W. Bliss Company; U. S. Tool Company; The Waterbury-Farrel Foundry & Machine Company.

Part 7 of Mr. Hinman's series will appear in an early number.

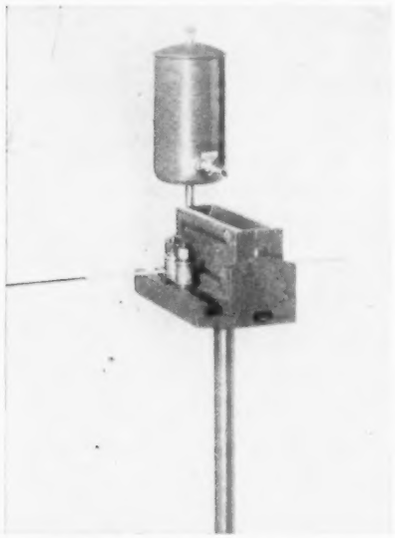


Fig. 32—Both sides of the stock are oiled by this device before it reaches the tools, thereby increasing die life

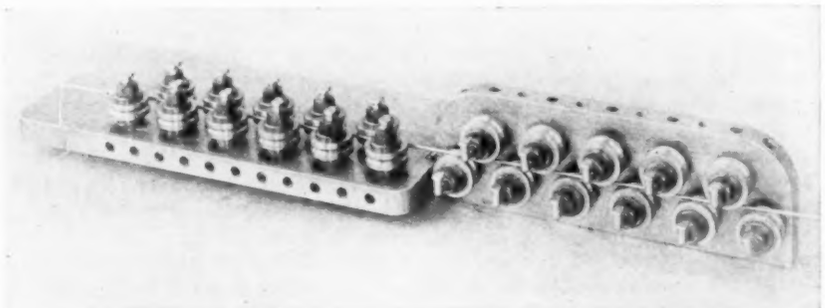


Fig. 31—Two-way straighteners will straighten round or a flat wire and tubing, the rolls being machined to suit the cross-section of the stock

Hourly Inspection

Traveling inspectors check work in process to catch errors early and make corrections in machine set-ups before mistakes are repeated

M. G. MONROE
Mills Novelty Company

IT IS our job to turn out four kinds of commercial refrigerator compressors with a high degree of accuracy in considerable quantity in one "flow" line of production. Each machine tool may be used on any one of the four by merely changing the jig. The following methods maintain accuracy of manufacture down the line and catch errors before many parts have been spoiled.

A man is started off right by requiring him to have the blueprint of the part before he can draw materials, tools, jigs and fixtures for the job. The blueprint is selected from the up-to-the-minute shop file according to the number given on the "traveler" which is a form of job order card.

Having the proper tools and materials, the workman makes the first piece and none other until it has been thoroughly checked for dimensions. If the first piece is passed, he begins production. During machine operations the main dimensions are checked with gages provided for the purpose. For example, crankshafts are checked with Arnold gages while being ground and diameters are again checked with Zeiss micrometers after the piece is removed from the machine.

The most important phase of our inspection includes the use of the mimeographed card illustrated. Instead of checking every piece, or checking by sampling methods, it is the job of our inspectors to go from one machine to another down the production line once every hour and thoroughly inspect one piece as it comes from each machine. If the dimensions are correct for that operation, the inspector punches the machine card OK. If not, he notes the fact on the card.

The workman is then supposed to report the fact to the foreman who is responsible for seeing that the necessary corrections are made and that the machine is adjusted as needed. The punched cards offer a ready check as to the machine's condition to the foreman as he passes along the production line. If for any reason the worker has failed to report that his machine is not operating satisfactorily, the foreman will catch it on his regular trip following the inspector. It is this inspection that stops spoilage losses and wasted work on pieces which would otherwise get through to final inspection.

The last piece to complete a run in any machine is also carefully checked. The worker is not released from responsibility and free to begin another job unless this last piece is approved.

Checked With Indicators

Every piece gets a complete check at the end of the production line before it goes into final assembly. All sorts of special gages have been devised to check critical dimensions on the compressor parts, all of them incorporating indicator dials reading to 0.0001 in. However, "go" and "not go" gages are used to measure hole dimensions because the diamond point of indicator gages cuts into the cast iron and gives faulty readings.

Since so much dependence is placed on gages throughout the shop, great care is exercised in checking them. A standing order is enforced to the effect that every gage must be checked every time it is returned to the toolroom. Johanssen blocks are used for checking.

In addition, a "precision" room has been established in which all jigs and fixtures, sample castings and occasionally parts in production are checked. A 3 x 4 ft. Taft-Peirce plate is used as a reference base for checking all dimensions. Johanssen blocks and indicator dials graduated to 0.0001 in. are used in conjunction with the plate.

DAILY INSPECTION RECORD

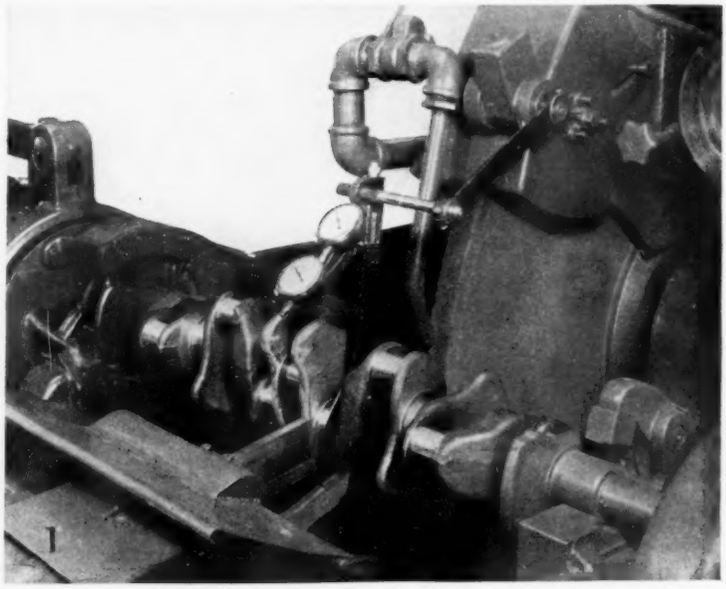
PART NO.			OPER. NO.		CLOCK NO.
PART NAME					DATE
	A.M.			P.M.	
	OK	NOT OK		OK	NOT OK
1			1		
2			2		
3			3		
4			4		
5			5		
6			6		
7			7		
8			8		
9			9		
10			10		
11			11		
12			12		

A card traveling with the work is checked hourly in accordance with the inspector's findings

German Light Diesels

Research conducted by German experts into torsional vibrations, together with progress in the production of strong, light construction materials have resulted in the production of light diesel engines with mechanical injection suitable for smaller motor vehicles, according to reports from Berlin. The diesel type has been used for some time for heavy trucks, motorbuses and for ships, but not for the light automotive types.

Seven WAYS TO FINISH A CRANK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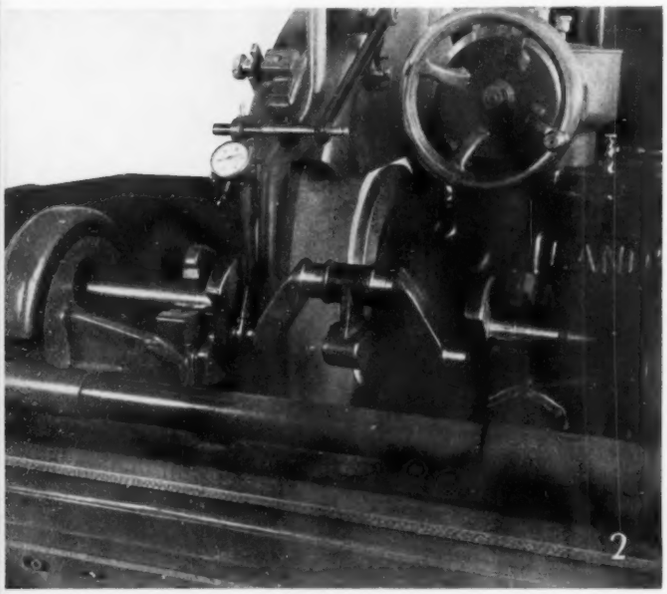
WHEN cranks get together they form a crankshaft. The important things about crankshafts are their bearings and their pins. All must be round and finely finished; and all must have a definite relation to each other. To obtain this finish and this relation, for good crankshafts, it is popular nowadays to grind both bearings and pins. Since the bearings are in line with the shaft center it is no great task to grind them. But the pins are offset and at odd angles. How they are held for various kinds of crankshafts is shown on these pages. Crankshafts for a variety of products have been selected to illustrate the work-holding methods.

1 AUTOMOBILE—The index plate at the far end has fixed stops to locate this typical eight-cylinder crankshaft. Rotating it to four positions brings the pins successively in line with the center of rotation. The shaft is located endwise against the left-hand clamping block. Longitudinal spacing is done by means of a bar attached to the front of the carriage. A good average production is 40 to 50 pins per hour

2 SMALL STATIONARY ENGINE—Here there are only two pin positions (but four pins). Angular and longitudinal location are provided by a plate on the left-hand carriage fixture. A pin in this plate simply engages two holes 180 deg. apart in the side of the end flange. As before, the spacing bar is on the front of the carriage. As in many crankshaft set-ups, sizing is controlled by an Arnold automatic gage

3 HOUSEHOLD REFRIGERATOR—This two-throw shaft is located radially in a V-shoe on an arm which is under spring tension. The arm is attached to the left-hand carrying fixture which also holds a pivoted stop for endwise location. When one pin is ground the shaft is turned end for end. The same V-shoe supports the pin, but the stop at the left is swung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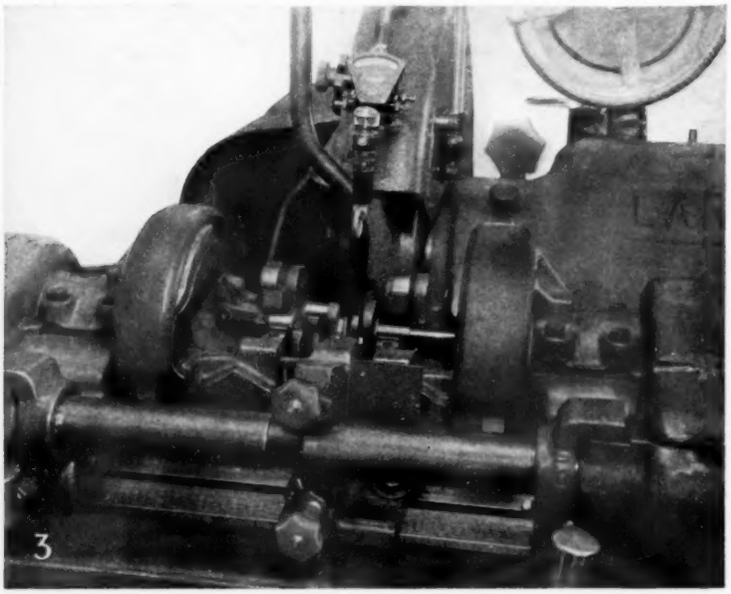
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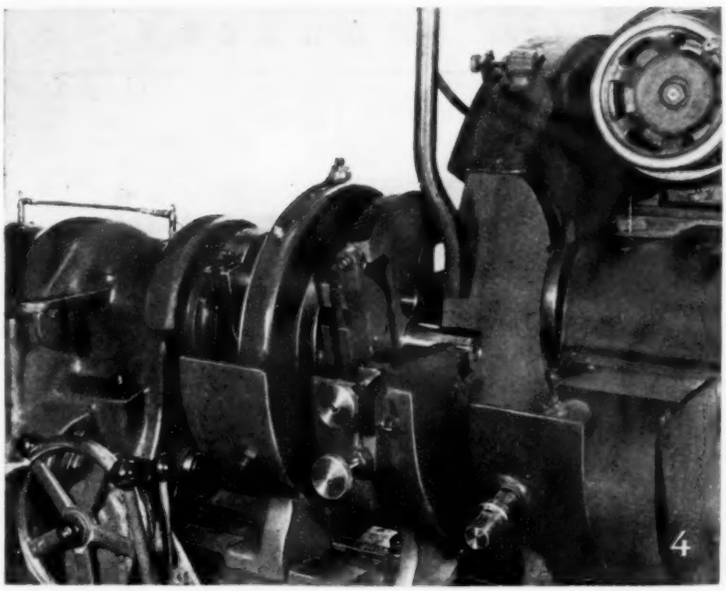
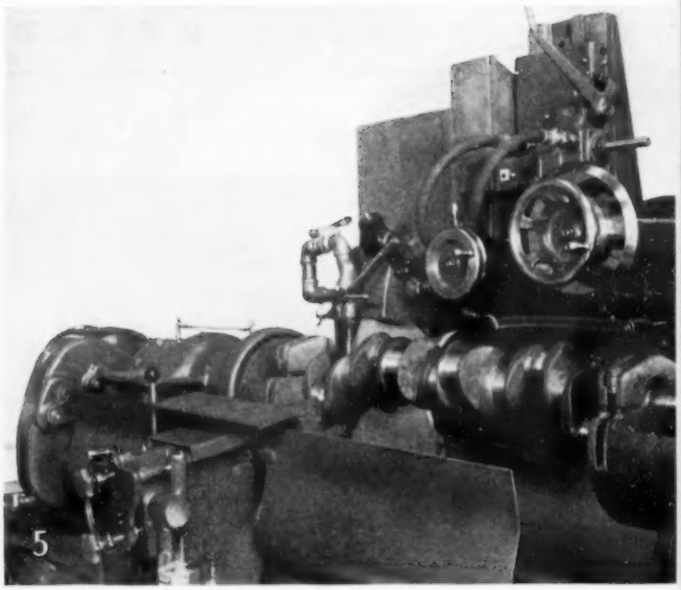




upward and another at the right is swung down into operating position. Output is 25 shafts per hour.

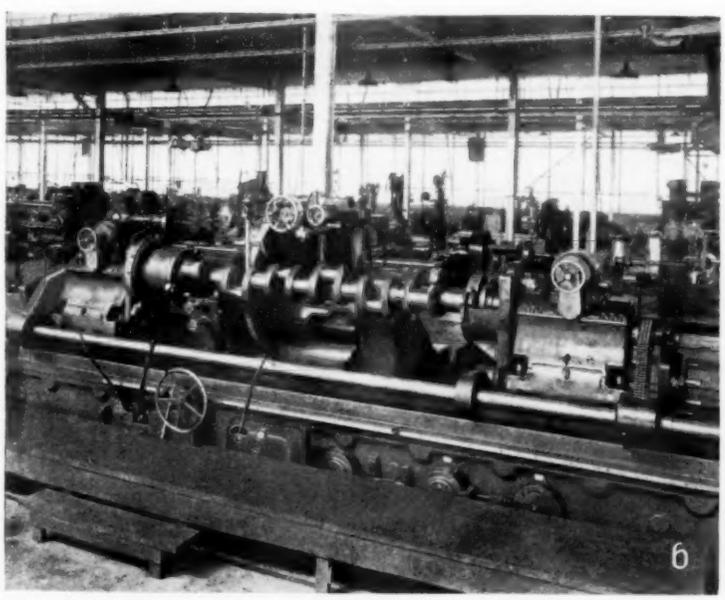
4 AIRPLANE—This is really a dual operation inasmuch as the fit is finish ground while the pin itself is only rough ground. Note the center rest which rigidly supports the long crank-carrying fixture and the pin support opposite the wheel. An arm extending upward from the front of the carrying fixture locates the shaft radially.

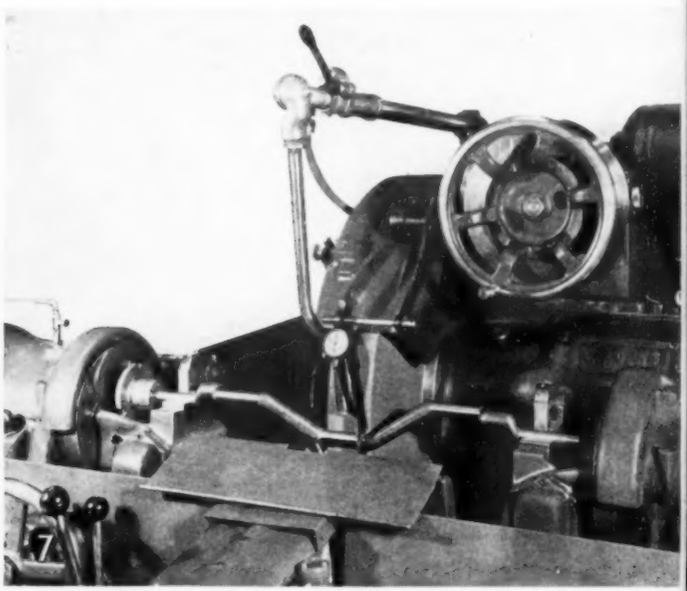
5 SMALL DIESEL — Not shown here, but in the rear of the crank-carrying fixture, is an arm which gives angular location. Although most crankshafts are located longitudinally against the side of the bearing block (as is this), some are located from the side of the center bearing. When this is required, an arm attached to a bracket at the front of the machine is swung out over the top of the work-rest when the shaft is loaded and located.

6 LARGE DIESEL — This crank-shaft weighs 2,000 lb. and is about 11 ft. long. A notched index plate, integral with the left-hand crank-carrying fixture, gives angular location. Both right and left carrying fixtures are mounted on slides which makes it posisble to grind shafts with a wide range of throws by simply shifting their positions. A 54-in. wheel is used, one of the largest employed for precision grinding.

7 STRAW WALKER — A flange adapter is attached to the left end of the shaft. Angular location is by means of a pin in the left-hand carrying fixture which engages one of three slots in the adapter. A milled pad at the base of the locating pin gives longitudinal location to the shaft.

Photographs by courtesy of the Landis Tool Company





PUBLIC RELATIONS *for* INDUSTRY

FACTS For the Foreman

Here are the answers to many questions now being asked about industry and its earnings, about machines and their influence on employment

1 Question: Where do factories spend the money that they get?

Answer: Factories took in $330,709,960,000 in the years 1929-1935, mostly from sales. Of that total, 71 per cent was spent for materials, fuel, transportation, supplies and other expenses; 3.6 per cent for replacement of plant and equipment; 21 per cent went to employees, management and owners.

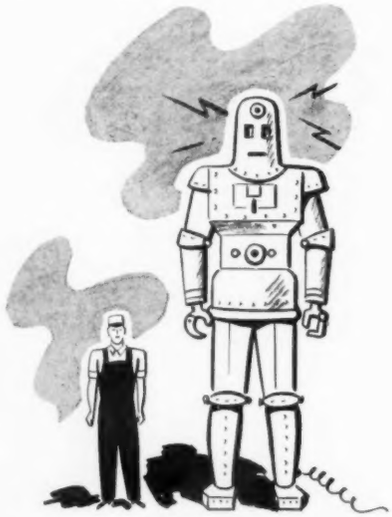
2 Question: How much does the factory worker get of the company's total income?

Answer: He gets 21 per cent. Of the money paid out to employees, management and the owners, he receives 56.3 per cent. Salaried employees, not including officers, receive 16 per cent. Executive salaries amount to 8 per cent, dividends to 19 per cent.

Actually, workers' wages are paid out of the value added in factories. As this value has risen (through use of better machinery, etc.) the wage earner has got more. Back in 1899 the average wage earner added $1,025 value annually to the materials with which he worked. He received $426, or about 41 per cent of it. In 1929 he added $3,603 and got $1,316, or 41 per cent, too. Right down through the years government statistics show that wage earners have received an average of 41 per cent of the value added by manufacture.

3 Question: Is the worker getting more of the national income or less of it than he used to?

Answer: Though greater sums of money are needed than formerly to erect, equip and maintain highly mechanized factories, workers are getting a larger part of the total national income than in former years.



LIKE A HUGH MECHANICAL HELPER, $8,000 worth of machinery aids each U. S. worker to increase his output and likewise his income

In 1900 about 53 per cent of the national income went for wages and salaries. In 1920 the share had risen to 63 per cent and in the last few years it has gone up to 67 per cent.

4 Question: Can factory workers be paid more merely by the process of a company's charging more for its products?

Answer: Theoretically that is fine, but practically it doesn't work. Prices can be boosted to some extent, but when they are raised, the time soon comes when fewer consumers are able to buy a product and the total revenue shrinks rather than expands. That was one of the reasons for the current depression. Labor leaders, through strikes, forced wages up so high that prices to the consumer had to be advanced to a point where people stopped buying.

5 Question: How well off is the factory worker today compared with any previous period?

Answer: Wages have increased faster than the cost of living. Yet wages themselves are not so important as what those wages will buy. Though lower in dollars than in 1929, weekly earnings today are about six per cent higher in terms of purchasing power. Real weekly earnings (purchasing power of wages) in 1929 were 37 per

cent above 1914 and today are 45 per cent above 1914.

6 Question: What is the purchasing power of the American worker compared with that of workers in other countries?

Answer: Statistics from the International Labor Office (League of Nations) shows that the American worker has a 100 per cent advantage over the worker in Great Britain, a 200 per cent advantage over the worker in Germany and a 300 per cent advantage over the worker in Italy in the purchase of food. Approximately the same proportionate advantage exists in other commodities bought at retail.

7 Question: What determines a worker's wage?

Answer: There are many factors, but one of the most important is the worker's capacity to produce. The more he can turn out, the better his wage is. What enables the American worker to produce more goods than workers in any other country is that he has more machinery at his command to help him. It is estimated that about $8,000 is invested in machinery and equipment for every factory job in the United States.

8 Question: What has happened to wages of factory workers compared with wages of other major occupational groups?

Answer: The average factory worker's wages have gone up more than 150 per cent on an hourly basis and more than 100 per cent on a weekly basis since 1914. In agriculture, on the other hand, there are the same number of farmers today sharing a total farm income of about the same size as in the pre-war period.

9 Question: What does industry do with its cash surpluses?

Answer: It puts the money in safe keeping for use in bad times. In four years of the big depression, it dipped deeply into its surpluses to maintain employment at a point far above production, paying out $27,000,000,000 more than it earned. During the seven-year period 1929-1935 industry paid out $7,555,934,000 more than it took in.

10 Question: Just how much of industry's income is carried over to surplus?

Answer: Only a tiny fraction of the whole. To be exact, it amounted to less than three-fourths of one per cent in the five years 1933-1937. It has shrunk to a dangerously low level recently because of the federal government's policy of heavily taxing corporate surpluses.

MADE BY HAND, without the use of machine tools, today's $600 automobile could not be sold for less than $3,500

11 Question: Are executives' salaries too high?

Answer: Perhaps, in isolated cases. But in 489 companies in 1935 (the latest year for which figures are available) they were only 3 per cent of factory payrolls, 6/10 of 1 per cent of sales and 12 per cent of dividends. Government statistics for the period from 1929 to 1932 show that the average salary of principal officers in factory industries was just short of $6,700. That's a long way from the $50,000 that the man in the shop thinks the "big shots" get.

12 Question: How big are industry's profits?

Answer: Not nearly so big as people sometimes imagine. In good years, such as from 1923 to 1929, only three plants out of five made profits, while in bad years, like 1931, only one plant out of four earned a profit.

13 Question: It is said that 30 hours a week is enough for any man to work, that industry can cut hours without cutting pay. Is that right?

Answer: The best way to answer that question is to quote a few figures. Back in 1929 the income of manufacturing industries totaled $19,727,000,000. They spent $11,607,000,000 of that in wages. On the 48-hour week then in force, some 8,822,000 wage earners received annual wages of $1,316. Let's suppose that they had worked only 30 hours a week. That would have put a lot of people to work. The number of wage earners would have jumped to 14,233,000. But there would have been no larger total income. There still would be only $11,607,000,000 to divide up for wages. The result would have been that each wage earner would have got $815 a year. Now let's say that the manufacturing industries had kept wages at $1,316 a year, cut hours to 30 a week, and employed 14,233,000 people. Then the yearly wage bill would have taken $18,730,628,000. Each of the salaried workers would have received $735.87. Nothing would have been left for those who put up the money. Nothing would have been available for surpluses to tide over bad times.

14 Question: What has the worker gained from mechanization of industry?

Answer: Higher wages, less working hours, more leisure and ability to buy many more commodities for himself and his family. Back in 1914 he had to work 187 hours to buy an electric washing machine. Now he works 70 hours to own a much better product.

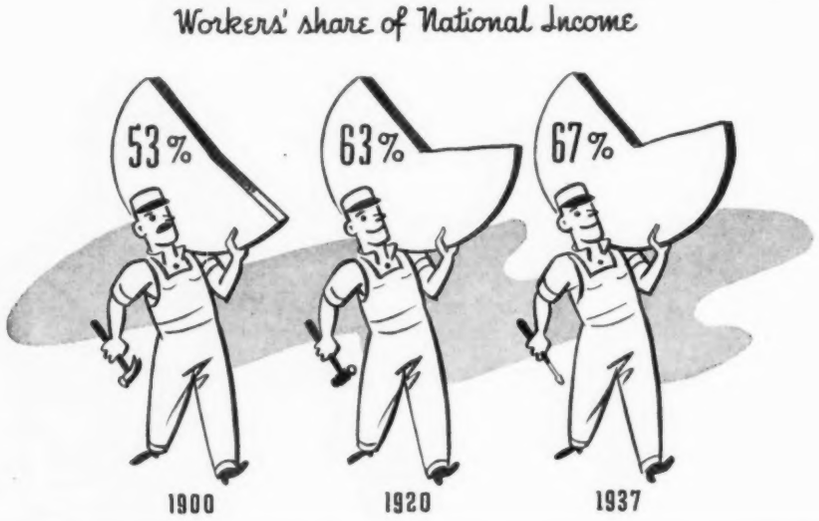
To buy a year's supply of clothing for himself and family he must work 349 hours today as against 708 hours in 1914. The ratio on other products is much like that for washing machines and clothing.

15 Question: Is it true that machines replace men?

Answer: No, not from an overall standpoint. The charge that machines replace men is based on the assumption that the same products could and would be made by hand labor as are made by machinery, and that men would have been hired to do the work that is being done by machinery. This is not true. The price of such products would cost anywhere from six to ten times what they do today if our plants were not tooled with modern equipment."

17 Question: How has factory employment been affected by use of modern equipment?

Answer: In all manufacturing industries employment per dollar of finished product was up 28 per cent in the period from 1929 to 1935, up 41 per cent in household laundry equipment, up 23 per cent in hardware, up 66 per cent in locomotives, up 31 per cent in stoves, ranges and furnaces. Contrary to the idea that mechanization has decreased employment, automobiles produced per man in a year declined from 12 in 1929 to 9.8 in 1936. The pounds of finished steel produced by a man in an hour declined from 112 in 1929 to 80 in 1935. Reasons for this decline, which actually amounts to an increase in man-hours required to produce an automobile or a ton of finished steel, are a greatly improved product which needs more processing.



A BIGGER SLICE of the national income has gone to the worker as the machine has increased in use

as automobiles, radios, refrigerators and household appliances, if built by hand, would be so high that most people couldn't afford to buy them. Today's big mechanized industries wouldn't even be in existence if they had had to depend entirely on hand labor.

16 Question: What would be the cost of some of today's popular products if made by hand instead of machinery?

Answer: Walter P. Chrysler has estimated that the car selling for $600 would cost at least $3,500 if made by non-mass-production methods. A typewriter costing $100 would have to be priced at $1,000. Says H. E. Blood, president of Norge Division of Borg-Warner Corporation: "Our stoves, refrigerators, automotive transmissions and washing machines

18 Question: What about employment in the growing industries as against employment in the vanishing industries?

Answer: Figures are available only up to 1930, but they show that the 19 principal growing occupations (highly mechanized) gained three times as many workers as the 19 principal vanishing occupations. The total gain in the growing occupations was more than 2,250,000, as contrasted with a loss of about 800,000 in the vanishing occupations.

19 Question: Have jobs increased or decreased?

Answer: In the 60 years from 1870 to 1930 the country's population increased 218 per cent, but the gainfully employed increased 291 per cent. In 1870, before technological advances had been made, 324 persons were engaged in producing goods and services for each 1,000 inhabitants. By 1930 the wants of the people, thanks to development of new products made largely by machinery, had grown to such an extent that 400 persons were at work filling the demands of each 1,000.

20 Question: How does the public benefit from industry's use of the most modern machinery?

Answer: The benefits of our industrial system are transferred to the consuming public in the form of lower prices. It is fundamental in the American economic system that prices be reduced and quality improved so that the entire country may profit from scientific and technological advances. Improvement in quality sometimes is more marked than price reductions. A good example: an automobile tire today lasts 10 times as long as the pre-war product did. The price has declined about 75 per cent while the value in service received per dollar expended has increased 3900 per cent.

21 Question: Has industry too much factory capacity?

Answer: Rather than being overbuilt, the country's production facilities have a capacity far below that needed to provide an adequate standard of living. Brookings Institution found that to give all families a "reasonable standard" of living, such as that advocated by the Bureau of Home Economics of the U. S. Department of Agriculture, would mean an increase of production of 75 per cent over 1929 levels.

22 Question: What would result if capital equipment remained in its present form and state of repair?

Answer: There would be grave doubt as to real prosperity ever returning to the United States. Much of the country's prosperity is traceable to the expansion of capital goods, especially to capital equipment.

Bill Smith Whistles While He Works

But what is metal-working's bill to keep him whistling, and what, besides music, is the return on the investment?

E. J. TANGERMAN
Assistant Manager, American Machinist

BILL SMITH, who typifies the average metal-working employee, likes to whistle while he works. And why not? His wages are high, his working hours short, his working conditions excellent. He benefits from an industrial system that has found that safety and working comfort pay big dividends in bettered production.

Occasionally he wonders what these things cost "the Boss"—in other words, how much he's paying for Bill's whistle. He may even wonder sometimes if that amount on his pay check wouldn't be better. Well, would it? How much do these things actually cost?

Sometimes Bill's Boss himself doesn't know. Press guards may have come with the presses, non-skid flooring with the building. The Boss may be his own first-aid man, using supplies from the insurance company. All these are difficult to evaluate.

To be sure, some larger companies with extensive safety and personnel departments have worked out detailed records. U. S. Steel Corporation, for example, has figures which show welfare expenditures of more than $10,000,000 a year for fourteen years. But how much annually is this cost per man, and how much does it pay?

A U. S. Steel executive has said, "Employees benefit from safety, and believe me, management does too . . . from 1906 to 1936 we spent $24,860,540 on safety work, including safety devices and salaries of safety directors. During those years we prevented 8,099 fatalities, 75,180 injuries which would have necessitated the loss of 35 or more days from work, and 612,814 disabilities of shorter duration. Based on the cost of settling similar accidents, our saving during these 30 years was $117,224,238. There may be an element of error in these figures, but it is the best way we have been able to work it out. Even if the figures are 50 per cent wrong, at least we got back the dollar that we paid for safety and another with it. I don't think anyone has to blush before his Board of Directors for an investment of that kind."

So much for a big company. But how about smaller ones? Well, Carpenter Steel Company did some extensive accident prevention work in 1923 and '24. As reported to the National Safety Council, the cost including dispensary salaries, supplies, guards and educational work was $8,665 in 1923, $6,838 in 1924. But the compensation the company paid, including hospital charges and outside physicians, dropped from $8,474 in 1923 to $3,265 in 1924. Accident prevention cost for this company, as for many others, now averages about a half cent per payroll dollar.

American Machinist recently completed a survey of a number of medium- and large-size metal-working plants. Some 88 filled-in questionnaires have been returned from plants employing 15 to over 16,000 men. They represent practice covering 88,258 workers—about 4 per cent of the national total in metal-working—in all kinds of metal-working plants. About half the questionnaires, covering a little under half the workers, gave some cost data.

Results of the survey are tabulated, on the basis of cost per worker, first for all the plants, and then for plants in each of three size groups: fewer than 100 workers, 101–500 workers, and over 501 workers. Figures were available for 10 plants in the first group, 17 in the second and 27 in the third. Both initial and annual costs are given for sixteen typical safety and comfort devices, ranging from the omnipresent goggles to safety flooring, dust filters and removal devices, wash fountains, cafeterias, even athletic equipment and group life insurance.

Although only fifteen states have legislation governing eye protection, 85 of the 88 plants reporting indi-

United States Steel Expenditures for a Fourteen-Year Period

Playgrounds, Schools, Clubs, Gardens, Visiting Nurses, etc.		$27,970,411
Sanitation		31,721,034
Accident Prevention		15,698,604
Relief for Injured men and the families of men killed		45,660,691
For Pension fund payments in excess of income provided by permanent fund		6,572,445
*Total pension payment to employees	$13,014,343	
*Additional benefit payments and administration cost	509,338	
For the creation of a permanent pension fund		8,000,000
Employees' Stock Subscription Plan		22,564,858
Total		$158,188,043

*Not included in total

cated that goggles were in use, from a low of three pairs in a fifteen-man plant to a high of 5,000 in an 8,000-man plant. As would be expected, both first cost and annual cost drop as the plant gets larger, because of advantages of quantity purchasing. Of course, it isn't possible to determine from these figures the average cost of goggles per goggle-wearer, because of the widely varying ideas of just which workers should wear them. In one large automotive forge plant, for example, every machinist wears them; in many plants they are required only when chipping, welding, or grinding.

Safety shoes are worn in only slightly over half the plants, some of the remainder possibly not indicating their use because the employee purchases them himself. Others make light metal products where there is little danger of falling weights; still others list as safety shoes only the boots worn by men in the galvanizing department. Apparently, employees of small plants buy their safety shoes direct, but in larger plants they usually get them through the company. In one case at least the company maintains a salesroom and a salesman to encourage their purchase. In most cases they are sold on the easy-payment plan through payroll deductions. One company provides rubber boots, but has men buy their own safety shoes.

Like goggles, the respirator or mask may be important in one plant, not nearly so important in another. Some small plants report respirators for only a painter or two, others having dangerous fumes or dust may have almost all workers equipped. Though only 19 states have even an advisory ruling on the use of respirators, 70 of 88 reporting plants use them.

Press guards are reported by 74 of the 88 companies, but there is some possibility that our intention—to specify guards protecting the operator's hands—may have been misconstrued to include various belt and gear guards as well. Be that as it may, the initial investment per worker is quite high, being exceeded only by one other item. Costs varied from a low of $1,000 for a 2,000-man plant to $10,000 for a 110-man plant, maintenance from a low of $20 a year in an 800-man plant to $800 a year in one 400-man plant.

Safety flooring installations vary from a $20 job to safeguard the galvanizing room in a 135-man plant to $25,000 to protect all floors and staircases of a 110-man plant. Maintenance cost likewise varies widely, depending upon type of floor and service.

Dust and fume filters and removal devices have long been common in plating and pattern departments, but with recent efforts to reduce silicosis, a number of plants are installing such systems to remove grinding and sanding dust, paint-booth fumes and spray. One 8,000-man automotive plant reported ten exhaust systems costing $1,000 each. Generally speaking, annual cost is largely that of power for operation.

Hospital and first-aid costs vary widely with plant, costing more per man in larger plants employing full-time doctors and trained nurses. None of the plants with fewer than 100 workers had anything but first-aid equipment. Plants in the intermediate range usually have a registered nurse in charge, and large plants have extensive hospitals with doctors and nurses in constant attendance. Thus an 8,000-man plant reports initial cost of $12,000 and operation cost of $49,000 a year, the latter obviously including doctor and nurse salaries. A 350-man and a 450-man plant each report initial cost of $2,000 and annual operating cost of $3,000, which includes a nurse's salary. A highly seasonal plant having from 135 to 400 employees spends $200 a year for supplies and $250 for the attending nurse. A 400-man plant pays its nurse $1,500 a year. One 500-man plant also gives free medical service for all ailments, including surgical operations when necessary, also a sick benefit of half the employee's wages after three days away from work and for a period of not longer than six months.

Foregoing items are typical of those often required by state or local safety codes, insurance company regulations, or other rulings. A second group deals

Costs Per Worker for Welfare

(Results of an 88-plant survey)

	Have Installed	Give Initial Cost	Number of Workers	Initial Cost per Worker $	Give Annual Cost	Number of Workers	Annual Cost per Worker, $	COST PER WORKER, $					
								UNDER 100 WORKERS		101–500 WORKERS		OVER 501 WORKERS	
								Initial	Annual	Initial	Annual	Initial	Annual
SAFETY													
Goggles	85	26	21,492	0.33	38	23,482	0.20	0.83	0.26	0.62	0.25	0.27	0.18
Shoes	46	5	4,200	0.34	9	12,220	0.20	*	*	0.25	0.36	0.13	0.17
Masks, respirators	70	24	20,822	0.26	28	20,917	0.12	1.20	0.29	0.39	0.17	0.20	0.10
Press guards	74	30	21,460	6.88	23	20,121	0.52	10.20	1.28	1.06	1.37	6.29	0.45
Flooring, treads	49	18	10,430	6.28	19	10,830	0.95	1.42	....	15.14	1.39	3.35	0.79
Dust and fume filters	64	27	22,244	10.20	17	14,764	0.80	26.54	1.91	23.10	1.23	8.98	0.72
First aid and hospital	81	28	27,765	2.04	39	23,827	4.02	1.64	0.52	2.14	2.62	2.02	4.68
COMFORT													
Soap and dispensers	67	16	16,856	0.12	34	22,110	0.22	0.65	0.29	0.35	0.33	0.08	0.18
Paper towels	68	7	3,724	0.14	35	22,578	0.31	0.10	0.32	0.33	0.49	0.17	0.30
Wash fountains	75	29	21,295	3.39	17	17,846	0.24	3.89	0.17	3.82	0.62	3.29	0.23
Man-cooler fans	57	24	19,854	2.38	11	14,729	0.18	4.53	0.14	3.25	0.38	2.02	0.17
Water coolers	67	23	19,841	4.07	20	16,119	0.43	11.34	0.54	3.42	0.72	2.42	0.42
Salt tablets	64	15	18,379	0.05	30	23,575	0.03	0.40	0.07	0.06	0.05	0.01	0.02
Cafeterias	30	12	16,874	6.52	9	14,710	0.94	25.00	....	2.38	0.41	9.71	0.97
GENERAL													
Athletic and sports equip.	53	20	18,145	4.87	27	20,174	0.74	2.74	1.91	1.09	0.90	6.12	0.69
Group life insurance	68	....	.....	.....	23	18,144	7.86	....	13.60	....	7.09	....	7.57

* Employees purchase.

with comfort or welfare items, such as hand soap and dispensers for example, which a company may provide for worker's convenience as well as a preventative of dermatitis. The various coolants, lubricants and quenches used in metal-working operations are usually difficult to remove from the hands and are often germ carriers, yet two of the plants reporting such soaps in use indicated they were for office workers only. An 8,000-man plant reports annual use of 60 barrels of powdered soap at $28 per barrel. It paid $2 a piece for its 75 dispensers, but in many cases plants indicated that these were supplied by the soap contractor. A 2,000-man plant, considering itself only 15 per cent equipped, has spent $500 for equipment and supplies.

Disposable towels are also provided by many larger companies to minimize dangers of infection of various skin diseases. While several plants report paper towels available only to office workers, an 8,000-man plant uses 100 cases of towels a year at $14 the case, a 2,000-man plant has installed some electric hand-driers, and a 400-man plant spends $450 a year for paper towels and disposable toilet-seat covers. One 500-man plant supplies cotton towels, which cost originally $125, and are now costing $245 per year for laundering and replacement.

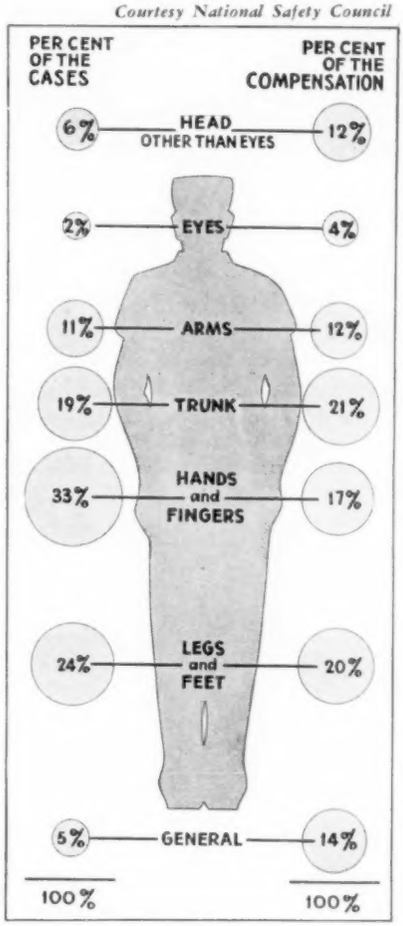
It is probable that many of the plants which checked "Wash Fountains" intended this to mean individual bowls, rather than the spray-type units intended. In any case, 75 of the 88 replying plants have either spray fountains or bowls, as distinct from the old-time dripping faucet or wash-trough. One 2,000-man plant considers itself only 10 per cent equipped, but has already spent $10,000 for wash fountains. An 8,000-man plant has provided 138 at about $25 each. An 850-man plant has its $2,100 worth of wash fountains supplemented with a $2,500 shower room.

Of course, metal-working's thousands of heat-treating and metal-heating installations require some sort of summer cooling, but relatively few plants have installed any generalized air-cooling equipment. Only one plant, a 400-man factory, reports a central air-cooling system. This cost $2,000 to install and $150 a summer to operate. Most of the 57 plants reporting man-coolers obviously use them only to cool men in very hot departments. Thus an 8,000-man plant reports 65, costing $25 each. A 750-man plant reports them in the foundry and blacksmith shop only.

Water coolers seem now to be in fairly general use, although in some cases the notation indicates that cooled water is supplied only for office workers. Some of the units reported are electrically operated, others ice-cooled. Thus one 320-man plant reports a $700 cost for coolers and $220 per year for the necessary ice. One reports using well water that is cold enough, another artesian well water.

Although salt tablets were made available only about five years ago,

Courtesy National Safety Council



Work Accidents, 1931-35

their use has grown by leaps and bounds, particularly in shops doing hot operations, such as forges, foundries, welding departments, hot-press shops, assembly departments, etc., 64 of 88 reporting plants now provide them, one 8,000-man plant having 80 containers. This plant paid $2.25 a piece for its dispensers, but most others get them on loan from the tablet supplier. The 8,000-man plant, however, has lowest tablet cost, averaging slightly under a cent per man per year.

Cafeterias are, of course, usually included only in larger plants. However, one 65-man plant now has a $2,500 cafeteria under construction, while a 2,000-man plant is building a $20,000 one. Some plants are in densely populated areas, hence have plenty of outside restaurant facilities; others provide them for office workers only. One 850-man plant has a cafeteria in cooperation with several other plants, but supplements this with a $23,000 investment in lunch and locker rooms. Several small plants have only canteens, supplying hot coffee, milk and desserts at a cost of only $2 per worker to install.

Two common "general-welfare" examples were provided in this study, athletic and sports equipment, and group life insurance. As would be expected, the larger plants provide the more elaborate sports equipment, small plants usually contenting themselvs with softball or horseshoes, with equipment often supplied by the men themselves. One 135-man plant, however, has a recreation hall with ping pong, pool, cards, darts and a radio. Another combines recreation hall and cafeteria. Another of the same size completed a new ball field this year, equipped with backstop, benches, and even adjacent horseshoe courts. Use, they report, has exceeded all expectations, and it has frequently been commented upon both by employees and other members of the community. One 2,000-man plant annually contributes $500 to the employee's athletic association. A 450-man plant reports an initial investment of $300 for softball equipment and a maintenance cost of $100 a year.

Last of the surveyed items it groups life insurance, which 68 companies report. Many plants have additional or alternate insurance forms—one reporting an employees' mutual benefit association which paid sick and accident benefits as well as $1,000 death benefit. A 500-man plant pays $\frac{3}{5}$ of the insurance cost, a 2,000-man plant also has health and annuity groups, an 8,000-man plant has group insurance which is not compulsory, even to new employees. One 135-man plant has been forced to give it up due to unsteady employment.

Bill Smith's health and good spirits are at least as important to his employer as they are to him—although many plants have only recently begun to realize it. Contrast the statement of U. S. Steel savings with last year's total cost of occupational accidents, over $700,000,000. Only $50,000,000 of this was medical expense; $550,000,000 was in wage losses, $110,000,000 in overhead insurance costs. Any reasonable device or practice which can reduce this enormous total justifies its existence from this aspect alone. As if Bill Smith's smile, bettered morale and bettered efficiency weren't justification enough!

IDEAS FROM PRACTICAL MEN

Simple Press Tools Produce Part from Scrap

CHARLES H. WILLEY
Superintendent of Manufacturing, Hoyt Electrical Instrument Works

We had to make many thousands of movement supports such as the one at *A*, Fig. 1. They were made from 1/32-in. soft brass scrap strip stock *B* that was left from another job. Four blanks were cut from the corners and pierced in the first operation by the tools shown in Fig. 2. The blanking punch, which is also the piercing die, is shown at the left, while the blanking die, which also carries the piercing punches and the stripper, is shown at the right. The stripper plate *A* is both supported and actuated by the rubber pad *B* which surrounds the punch and is under the stripper plate. Four guide pins *C* slide in holes *D* in the shoe. Guide pins *F* in the top of the stripper plate locate the stock. The upper member of the tools is shown at the right, and besides carrying the blanking die *H* it also carries the punch plate *I*, in which are the piercing punches *K*, the stripper *L*, and the knockout *M* for which the back *N* of the die is recessed.

The second operation consists in bending the tongue and the portion containing the slot at right angles in the tools in Fig. 3. The lower or die member consists of the bending

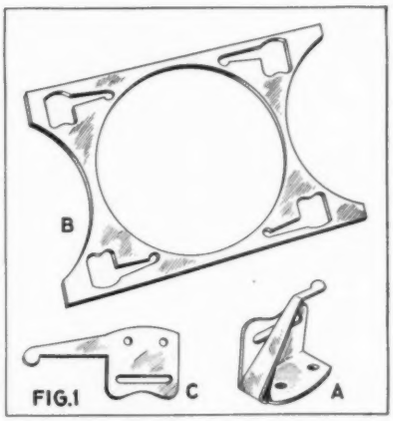


Fig. 1—The part is blanked and pierced from 1/32-in. soft brass scrap strip stock that was left over from another job and would otherwise be wasted

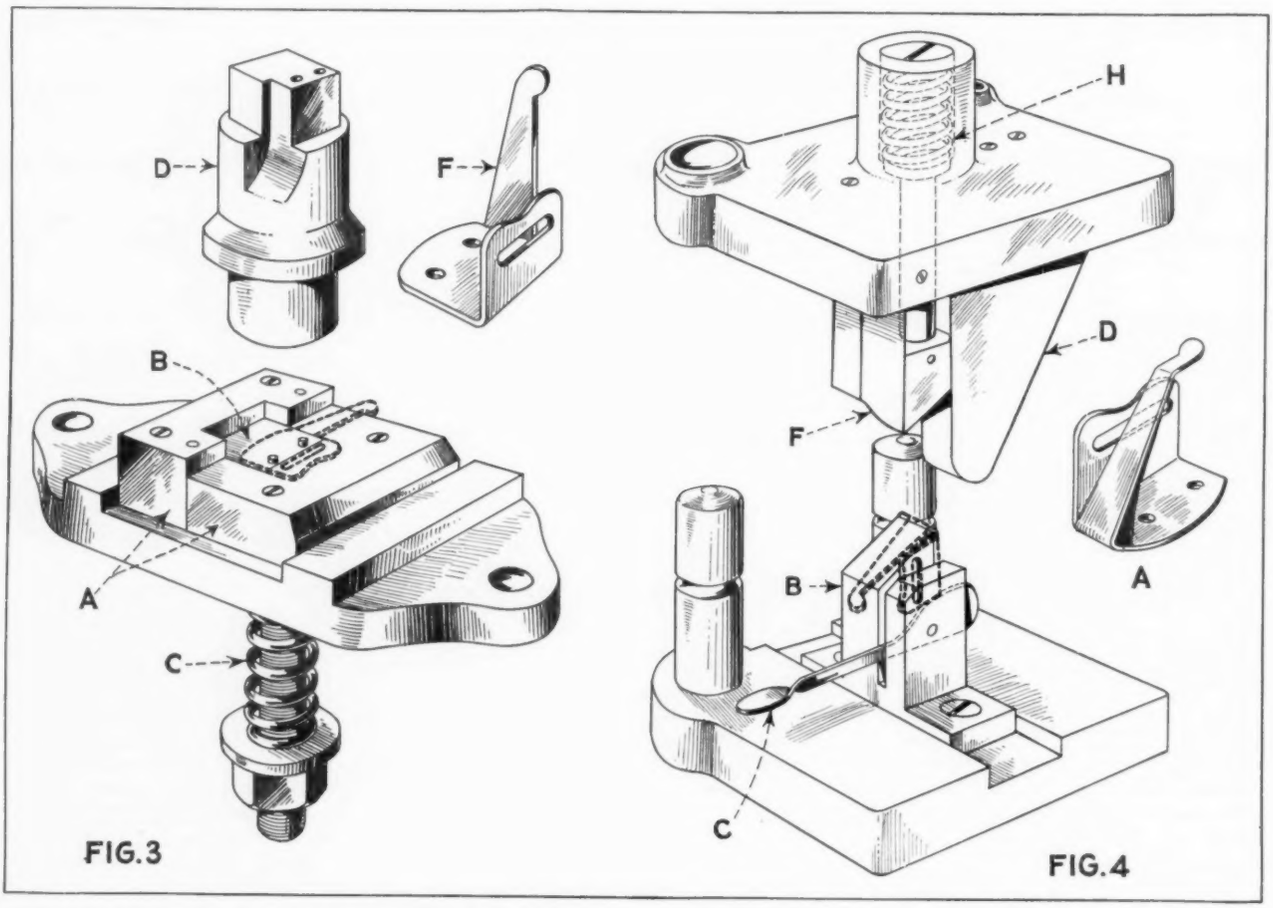


Fig. 3—The part is held on the pressure plate which is backed by the buffer spring, and the tongue and the slotted portion are bent at right angles

Fig. 4—In the last operation, the part is held on the slotted anvil and the end of the tongue is bent over by a spring-actuated punch

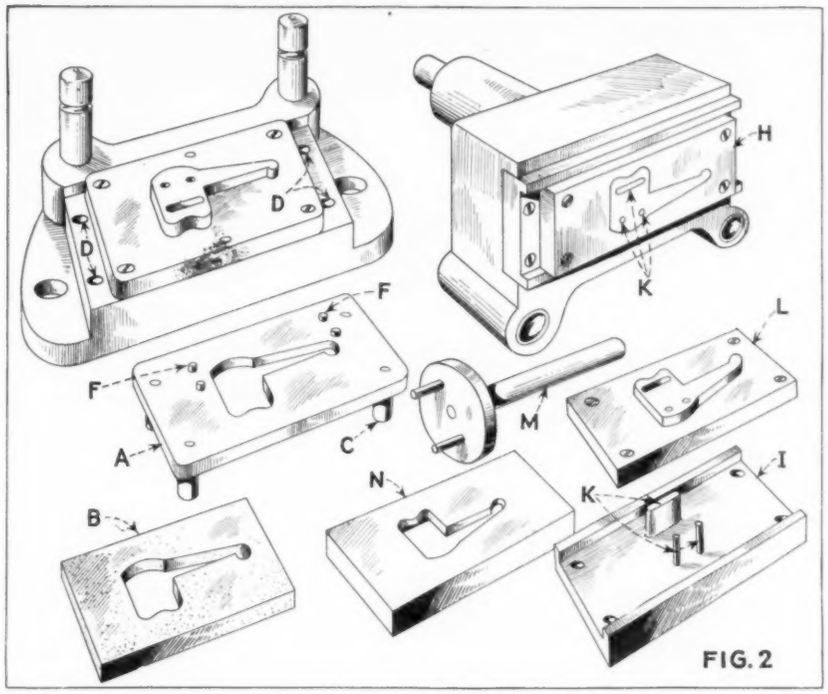


Fig. 2—The lower member is the blanking punch which is also the piercing die. The upper member is the blanking die and carries the piercing punches and the stripper

die *A* which is made in two parts; the pressure plate *B;* and the buffer spring *C* beneath the die. The upper member is the bending punch *D*. When the ram descends and the punch meets the blank on the pressure plate, it hold it firmly between its end and the pressure plate and carries it down into the die where the pressure of the buffer spring not only holds it while the portions outside of the punch are bent to right angles, but it ejects the piece as the ram ascends. At *F* is shown the result of the operation.

The last operation is folding the end of the tongue over into the position shown at *A* and is performed by the tools illustrated in Fig 4. The lower member consists of the slotted anvil *B* and the ejecting lever *C*. The upper member consists of the punch *D* which is long enough to meet the part and hold it on the anvil, and the bending punch *F*. As the ram descends, the forming punch *F*, backed by the spring *H*, meets the end of the tongue and bends it over the anvil. On the up stroke of the ram, the piece is left on the anvil and is ejected by the operator striking the ejecting lever a quick blow with a stick.

It may seem to the reader that some of these tools might be slow in operation and that the cost of the part could be reduced by better tooling. Perhaps there may be a better way; if so let's have it. But the tools illustrated permit the use of scrap, and the piece rates for the three operations amounts to but thirteen cents per hundred pieces. The tools have been in use for two years and have produced more than 60,000 parts and the only upkeep charges were for two grindings of the blanking die.

Grinding Fixture With a Floating Clamp

WILLIAM B. GREENER

A work piece, shown by heavy dotted lines, is held without cocking in a grinding fixture by a combined clamp and C-washer.

Essentially the fixture consists of the steel sleeve *A* screwed on the nose of the work spindle of the grinder; the hardened and ground locating ring *B* screwed and doweled to the outer end of the sleeve; the stud *C*; and the combined clamp and C-washer *D* having a spherical seat to fit the spherical surface of the clamping nut.

In operation, the work is placed on the fixture, being located by the ring *B*. The combined clamp and C-washer is placed on the outer end of the stud and against the work. The clamping nut *F* is then tightened and its spherical surface bearing in the spherical seat in the combined clamp and C-washer causes the washer to float against the work and hold it without cocking.

After the work has been ground, the clamping nut is backed off a few turns to provide clearance for slipping off the combined clamp and C-washer and the work is then slid off over the nut.

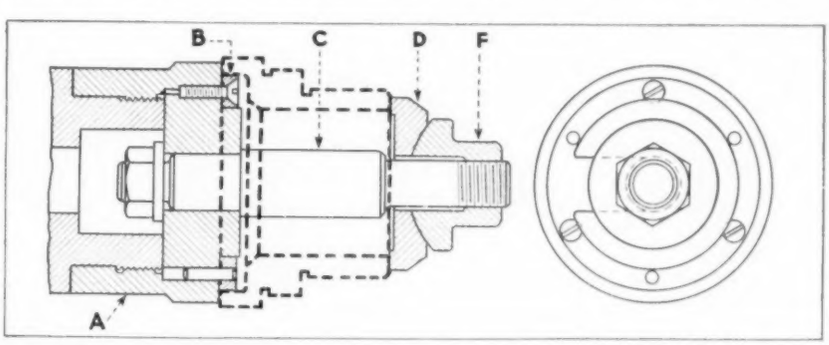
Eccentric Mandrels

MARTIN H. BALL

Two types of eccentric mandrels are shown in the illustration, one having an adjustable throw, while the throw of the other is fixed.

The mandrel shown in Fig. 1 has an adjustable throw of from 0 to $\frac{1}{2}$ in. It is made longer than required so that the tits containing the centers on which it is originally turned can be cut off, as shown by dotted lines. It is clamped in a V-block having dimensions *A-A* equal and the assembly is clamped to the milling machine table so that the center of the mandrel and the center of the machine spindle are in accurate alignment. The parallel block *B* is clamped to the table, bearing against the side of the V-block, and the table is moved $\frac{1}{2}$ in. lengthwise, bringing one end of the mandrel into position for drilling and countersinking the offset center by tools held in a drill chuck mounted in the machine spindle.

After offset centering has been completed on one end of the man-



The work is located by a steel ring on the sleeve and is held by a nut having a spherical surface bearing in a spherical seat in the clamp

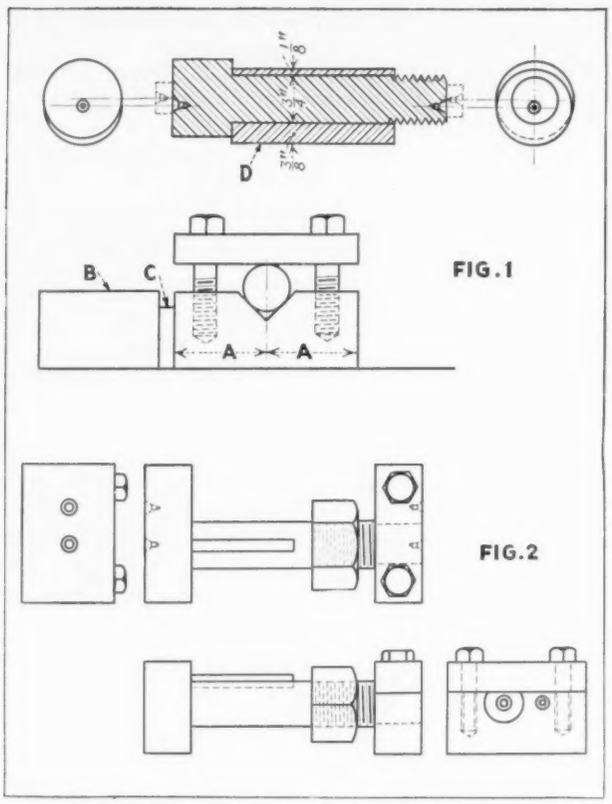
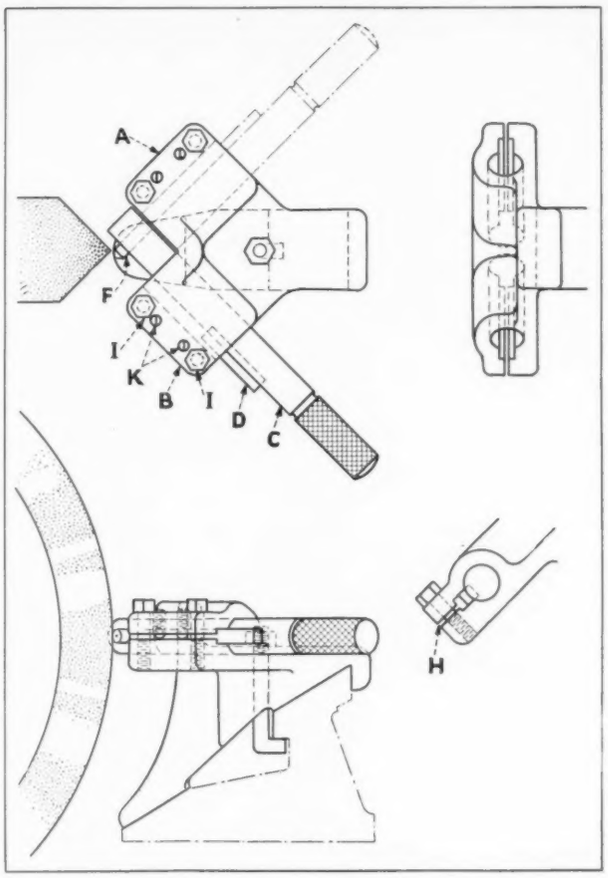


FIG. 1

FIG. 2

Fig. 1—By clamping the sleeve in different positions, throws from 0 to ½ in. can be obtained. Fig. 2—The offset centers are in both the removable and the fixed heads



The diamond holder is alternately used in the two angular bearings. Sliding it back and forth traverses the diamond across one side of the wheel face at an angle

drel, the assembly is loosened and is rotated 180 deg. in the horizontal plane, bringing the other end of the mandrel toward the centering tools. The V-block carrying the mandrel is reclamped to the table with the ¼-in. block *C* held tightly between it and the parallel block, bringing the mandrel into position for drilling and countersinking the second offset center. If desired, instead of using the ¼-in. block, the table can be moved ¼ in. endwise after having clamped the side of the V-block against the parallel block.

The sleeve *D* is bored for a snug fit on the mandrel and is held tightly thereon by a nut (not shown) and is turned to the required diameter. A key may be put in the thick side of the sleeve to engage a keyway in the work to prevent it from turning, or setscrews in the work may be used for the same purpose. The threads on the end of the mandrel and in the nut should be S.A.E. or finer to afford good holding power, since the sleeve is prevented from turning on the mandrel only by the clamping effect of the nut. It will readily be seen that by rotation and clamping the sleeve on the mandrel in different positions, any throw from 0 to ½ in. can be obtained. Light cuts should be used for work held on this mandrel.

The mandrel having a fixed throw, Fig. 2, covers the field where the throw is too great for the offset centers to be in the mandrel itself. One end of the mandrel is clamped by its flat in the removable head. In cases where the offset center in one end would come in the joint between the end of the mandrel and the hole in the removable head, both the end of the mandrel and the hole in the removable can be made small enough in diameter to bring it in the removable head.

Both mandrels are positioned for drilling and countersinking the offset centers by the same methods, but the amount the table is moved and the thickness of the size block used must be different in each case.

Fixture Dresses Wheel to a V-Shape

J. R. WHITTLES

Illustrated is a fixture for dressing the face of an abrasive wheel to a V-shape at an included angle of 90 deg. The base has two projections *A* and *B* each bored at an angle of 45 deg. to form bearings in either of which the diamond holder *C* can slide freely. The key *D* in the holder engages a keyway in each bearing and prevents the holder from turning on its axis. The keyways are wide and deep enough to permit the holder to be withdrawn through the bearings while the diamond setting *F* is in place, the setting being seated in a crosshole in the holder as shown in the above sketch.

Saw slots in the bearings at *H* provide means for adjustment by tightening the screws *I*, while the apposing screws *K* prevent the bearings from being adjusted too tightly. The slots are filled with strips of felt to prevent the entrance of grit and dirt to the bearings.

In use, with the fixture correctly positioned, the diamond holder is entered in one of the bearings and is slid back and forth so that the diamond travels across one side of the face of the wheel at an angle of 45 deg., the depth of cut being controlled by the cross-feed of the machine. After one angle has been dressed, the diamond holder is withdrawn from the bearing and is transferred to the opposite one, repeating the first operation.

AMERICAN MACHINIST *Reference Book Sheet*

Time-Data Sheet No. 13

Handling Operations—Heat-Treating and Cleaning—III

NORMALIZE—*Continued:*

Variable elements per furnace load (V):

Take truck to tray storage rack (trays necessary only for small forgings), per load	0.54
Place 8 trays on stands, per load	2.46
Return 8 trays to rack, per load	2.84
Total, per load	5.84

Variable elements per piece (P):

Place piece on tray or stand:	
Large, heavy forgings handled one at a time, per piece	0.31
Large forgings handled two at a time, per piece	0.19
Medium-size forgings handled two at a time, per piece	0.08
Small forgings handled three or more at a time, per piece	0.05
Place piece in pan or on skid:	
Large, heavy forgings handled one at a time, per piece	0.31
Large forgings handled two at a time, per piece	0.16
Medium-size forgings handled two at a time, per piece	0.07
Small forgings handled three or more at a time, per piece	0.05

Note: Forgings are normalized on 8x10 in. cast Nichrome stands and the furnaces are large enough to hold eight stands, two rows of four each, set so a fork on an electric lift truck may reach the rear of the furnace with a load of stands. Sheet metal trays are used on top of these stands when large quantities of small forgings are to be normalized. Standards are based on full furnace loads which always are made up of forgings of the same classification as to size and material, but not necessarily the same part number. Loading area of hearth measures 30 in. wide and 54 in. deep.

CARBURIZE—IN POTS:

In setting carburizing standards, the following factors are to be considered: (1) diameter and height of piece; (2) number of pieces per lot; and (3) special requirements—such as: plug holes with fire clay and center piece in pot, which means that only one piece per layer can be packed in a circular pot. The number of layers per pot is determined from a separate chart, which is based on the height of the part. Diameter of the part determines the number of pieces per layer in the pot. Pot size is determined so that, wherever possible, the whole lot can be packed with a minimum of unused pot space and without leaving a few pieces over to be packed separately. All pots are 15-in. high and range from 6 to 15 in. in diameter. An average carburizing furnace load is 20 pots.

$$\textit{Allowed minutes per piece} = V + (7.58 \div P) + (13.01 \div L)$$

Where: V = Total of variable elements, per piece.
P = Number of pieces per pot.
L = Number of pieces per lot.

Description of Element:

Move box of parts to platform, per lot	0.70
Move carburizing pot to platform, per pot	0.38
Remove cover from pot, per pot	0.08
Move barrel of compound to platform, per lot	0.40
Spread layer of compound	Variable
Tamp down compound	Variable
Place piece in pot	Variable
Fill pot to top with compound, per pot	0.47
Wire test piece and place in pot, per lot	0.78
Place cover on pot, per pot	0.15
Tamp cover down, per pot	0.27
Wipe chalk marks from cover, per pot	0.20
Mark cover with part number and time, per pot	0.38
Place pot aside, per pot	0.17
Place box aside, per lot	0.61
Place barrel aside, per lot	0.22
Place pot on stand, per pot	0.20
Bring truck to platform for 20 pots, per pot	0.03
Raise stand of 20 pots, per pot	0.01
Truck stand of 20 pots to furnace, per pot	0.04
Get helper, per pot	0.04
Get hooks, per pot	0.06
Raise door and thermocouple, per pot	0.01
Lift pot and slide in furnace, per pot	0.40
Lower door and thermocouple, per pot	0.01
Put hooks away, per pot	0.06
Return truck to platform, per pot	0.03
Lower stand, per pot	0.01
Return truck to position, per pot	0.02
Set pyrometer, per pot	0.04
Check heat on recorder, twice per furnace load at 0.81 min. each, per pot	0.08
Record load on data sheet, per pot	0.30
— Furnace Time —	
Bring truck to platform, per pot	0.03
Raise stand, per pot	0.01
Truck stand to furnace and raise stand, per pot	0.06
Get helper, per pot	0.04
Get hooks, per pot	0.09
Raise door and thermocouple, per pot	0.01
Slide pot out of furnace and on stand, per pot	1.05
Lower door and thermocouple, per pot	1.01
Put hooks away, per pot	0.09
Return truck with stand to platform, per pot	0.09
Lower stand, per pot	0.01
Return truck to position, per pot	0.02
Helper returns to other work, per pot	0.03
— Cooling Time —	
Remover test piece from pot and inspect, per lot	6.84
Move barrel to platform, per lot	0.40
Move box to platform, per lot	0.45
Get pot from stand, per pot	0.20
Dump pot into sieve, per pot	0.22
Sift compound through sieve, per pot	0.30
Place parts in box	Variable
Place pot aside in storage space, per pot	0.16
Paper work in box, per lot	0.61
Truck 2 lots to hardening furnace or sandblast, per lot	2.00
Mix compound for average pot, per pot	1.72
Total of constant elements, per pot	7.58
Total of constant elements, per lot	13.01

Variable Elements:

Spread layer of compound, per layer (divide by pieces per layer for time per piece)	0.26
Tamp down layer of compound, per layer (divide by pieces per layer for time per piece)	0.20

AMERICAN MACHINIST *Reference Book Sheet*

Time-Data Sheet No. 14

Handling Operations—Heat-Treating and Cleaning—IV

Place large piece (accessory drive gear, reduction gear pinion) in pot, per piece	0.162
Place small piece (ball end, roller, adusting screw) in pot, per piece	0.068
Place piece in box:	
Packed in box, per piece	0.50
Dumped in box, per pot (divide by pieces per pot for time per piece)	0.40

NITRIDING:

Where parts like brackets and rings are placed on bars:

Allowed minutes per piece = $0.231 + (3.22 \div L)$

Where: L = Number of pieces per lot.

Description of Element	*Std.Min.*
Get bars from rack, per lot	0.90
Pick up piece and load on bar (average 11 pieces per bar load), per piece	0.068
Place in furnace and space pieces along bar, per piece	0.095
— Furnace Time —	
Get box, per lot	0.22
Remove bars from furnace, per piece	0.027
Remove pieces to box, per piece	0.041
Return bars to rack, per lot	0.90
Deliver box of parts to Inspection, per lot	1.20
Total standard minutes, per lot	3.22
Total standard minutes, per piece	0.231

Where small shafts and gears are handled two or more at a time are placed in furnace on plates:

Allowed minutes per piece = $0.12 + (1.01 \div P) + (3.54 \div L)$

Where: P = Number of pieces per plate.
L = Number of pieces per lot.

Description of Element	*Std.Min.*
Get bars from rack, per lot	0.90
Take bars to furnace (average is 5), per lot	0.27
Place bars in furnace, per lot	0.27
Select plates according to size and shape of part, and number of pieces per lot, and place plates in furnace, per plate	0.54
Place piece in hole in plate, per piece	0.07
— Furnace Time —	
Remove plate from furnace, per plate	0.47
Get box, per lot	0.30
Remove piece from plate to box, per piece	0.05
Place orders in lots and deliver to Inspection, based on 3 lots per delivery, per lot	0.90
Return bars and plates to rack, per lot	0.90
Total standard minutes, per lot	3.54
Total standard minutes, per plate	1.01
Total standard minutes, per piece	0.12

Where small parts are placed in furnace on screens:

Allowed minutes per piece = $0.15 + (0.82 \div S) + (3.00 \div L)$

Where: S = Number of pieces per screen.
L = Number of pieces per lot.

Description of Element	*Std. Min.*
Get bars from rack, per lot	0.90
Take bars to furnace (average is 5), per screen	0.34
Place bars in furnace, per screen	0.34
Select screen and place on bars, per screen	0.14
Load pieces on screen, per piece	0.07
— Furnace Time —	
Get box, per lot	0.30
Remove piece from furnace and place in box, per piece	0.08
Place orders in lots and deliver to Inspection, based on 3 lots per delivery, per lot	0.90
Return bars and screen to rack, per lot	0.90
Total standard minutes, per lot	3.00
Total standard minutes, per screen	0.82
Total standard minutes, per piece	0.15

Note: Box of nitriding furnace measures 24-in. wide, 64-in. long and 24-in. deep. Plates measure 16x4 in., 20x6 in., 14x6 in. and 12x6 in. Number of holes in the several plates ranges from 3 to 125 and the holes are from $\frac{3}{8}$ to $1\frac{3}{4}$ in. in diameter. Center distance between holes ranges from $\frac{5}{8}$ to 3 in. Screens measure $14\frac{1}{2}$x23 in., 9x$21\frac{1}{2}$ in. and 9x$11\frac{1}{2}$ in. Time for sealing and closing the furnace, and for furnace attention, is included in a weekly allowance not included in the values shown.

SALT HARDEN ON RACK:

Wire racks used for bolts, shafts and pinions are constructed in the form of trees. Parts are held in a vertical position whenever possible in order to minimize warping tendencies. Salt pots are 15-in. in diameter and maximum depth of the round bottom of pot is 18 in.

Allowed minutes per piece = $0.05 + (2.90 \div R) + (4.37 \div L)$

Where: R = Number of pieces per rack.
L = Number of pieces per lot.

Description of Element	*Std. Min.*
Move pan to bench, per lot	0.67
Get rack and place on bench, per load	0.41
Position piece in rack, per piece	0.05
Place rack in preheater, per load	0.27
Place rack in salt bath, per load	0.61
— Furnace Time —	
Check heat, per rack load	0.24
Remove rack from salt bath and drain, per load	0.45
Quench rack load in oil, per load	0.54
Dump rack load in pan, per load	0.38
Inspect hardness of first piece, per lot	2.70
Deliver two lots to draw furnace, per lot	1.00
Total standard minutes, per lot	4.37
Total standard minutes, per rack load	2.90
Total standard minutes, per piece	0.05

SALT HARDEN IN BASKET:

Small threaded parts, such as studs, screws and bolts, are hardened from a neutral salt bath. The parts are placed in a woven wire basket, the inside dimensions of which are $5\frac{1}{2}$ in. diameter and 3 in. deep. Only the contents of the basket are quenched; the basket being refilled while still hot and returned to the salt pot. The quench tank basket, which covers the bottom of the tank, is raised and lowered by a rapid-acting air hoist to which it is attached permanently. Size of piece determines the number of pieces per salt-bath basket load.

Allowed minutes per piece = $(3.45 \div B) + (5.03 \div L)$

Where: B = Number of pieces per basket load.
L = Number of pieces per lot.

(To be concluded in an early issue).

NEWS OF THE INDUSTRY

Railroad Outlook Refuses to Reflect Recent Business Improvement

Purchases of equipment much fewer than carloading figures would indicate; adoption of profitable light-weight trains seen as bright spot on horizon

RAYMOND R. WIESE

CHICAGO—Just as the Egyptians back in Joseph's time had their seven lean years even so the railroads and railroad suppliers have had theirs. Unfortunately it doesn't look as though the present lean years will be limited to seven unless something drastic occurs. A million carloads a week was not considered unusual back in '28 and '29 but the bottom fell out of the railroad business around 1931 and never recovered. Right now freight loadings are running about 43 per cent behind the 1925-1929 average and estimates for the fourth quarter show an expected loss of 3.6 per cent over the same period last year.

The bad state railroads are in compared to ten years ago is indicated by the July 1938 operating net of Class I railroads of $38,387,209 as compared to July 1928 net of $95,226,267. Out of these amounts taxes, interest and dividends must be paid before there is anything available for investment in equipment.

Car loading is the barometer not only of actual railway activity but is the signal for increased or decreased activity in buying. When car loadings rise near the 800,000 mark there is a shortage of cars and equipment manufacturers are deluged with inquiries. As one manufacturer said, "It is either a feast or a famine in this business. When the rate is low the railroads recondition their cars and the only business is in spare parts."

The curtailment of activity in the car and locomotive manufacturing field is indicated by the orders of Class I railroads which on September first were 8,892 freight cars as compared to 31,419 a year ago and 22,354 two years ago. New electric and diesel locomotives on order total 26 compared with 37 in 1937 and 17 on September 1, 1936.

Railway supply business of all kinds has been hard hit and some firms which were the mainstays of their communities are almost closed down. Some such as Bettendorf Co. have gone into diversification of products which has only partially relieved the labor situation.

Maintenance has been badly neglected as indicated by the drop in rail purchases. The recent $2 cut in steel rail prices only mildly stimulated buying interest. It seems hardly possible that this situation can continue much longer particularly with the trend toward high speed trains in whose manufacture there still is activity. If the money can be found either through pay cuts or by a spurt in car loadings to unexpected levels the first to profit should be track supply manufacturers and the steel people. Curtailment of maintenance help may force buying of new equipment to increase productiveness of those men left.

There is agitation for congressional action which is believed necessary to help the railroads, as it is doubtful if more than a small portion of the pay cuts will go through and the present business situation indicates that only a slow increase in car loadings can be expected. The following points are suggested as demanding attention: repeal of the long and short haul clause, repeal of the requirements that land grant railroads be relieved of transporting government supplies and troops at one-half rate, and that the control of rates be placed more in the hands of the actual operators who are familiar with the conditions in their own territories. By these various means it is hoped that the present income of the railroads plus what can be picked up by changes in freight rates and adjustment in wages will counterbalance the present bad situation.

Summing up therefore, there is no bright spot in the railroad picture and that at the best there will be a minimum of expenditure next year—most of it for needed track supplies and such equipment as will go along with a modernization program.

An example of how this modernization program may eventually prove to be one of the solutions of the problem is indicated by the experience with the Rocket traveling from Chicago to Peoria. Where once a 20 passenger average existed, the Rocket today makes two round trips with space for 120 passengers per train. From September 1937 to January 1938 this train showed a net profit of over $100,000 which means that the total cost of some $400,000 dollars will be paid off in less than two years.

Similar experience on the Burlington indicates that possibilities for improved and modernized service is one way of getting business back to the railroads. However, since this is passenger business and represents only a small portion of their income it is not much solace to the railroads. It is of interest to note that the railroads are continuing their research programs and are working on the development of streamlined steam locomotives as well as working with the diesel and electric types. Companies such as Pullman-New Standard with their work in light-weight freight cars are pointing the way to eventual savings in operating costs.

The accompanying table shows the ready response of expenditures for equipment to changes in carloadings.

(Figures Include First 7 Months Only)	1937	1938	Per cent decrease
Car loadings (weekly average)	760,303	550,031	28
Manufactured goods	$435,790,000	$191,196,000	56
Locomotives and cars	$ 32,225,000	$ 15,877,000	49
Rails	$ 33,139,000	$ 14,042,000	57

L. W. CHUBB

Delegates from 22 Cities Attend A.S.T.E. Meeting

PITTSBURGH—A total of approximately 500 members of the American Society of Tool Engineers, coming from 22 industrial districts, attended the semi-annual meeting of the society in Pittsburgh, October 14–15. Visits to plants of the Westinghouse Electric & Mfg. Co., Mesta Machine Co., Homestead Works of the United States Steel Co., Aluminum Co. of America, Firth-Sterling Steel Co., and the Mellon Institute were included in the program. Dr. L. W. Chubb, director of research laboratories, Westinghouse Electric & Mfg. Co., gave an illustrated talk on "Industrial Advance Through Scientific Research" at the Saturday morning technical session. He traced the development and need for industrial research, and showed how a rapid expansion of industry and improved living conditions come from scientific investigations carried on in the fields of the various basic sciences.

Zimmerman Points Out Benefits of Research

HERSHEY, PA.—Laying particular emphasis on the necessity of research if an organization is to maintain a secure place in the country's economic system, Dr. Rufus E. Zimmerman reviewed many important scientific advancements in a talk before the Robert Morris Associates on Oct. 11, U. S. Steel Corp., also stressed the part research has played in insuring the success of many enterprises.

Admitting that what one industry terms progress might not be so regarded by another. Dr. Zimmerman nevertheless assured his audience that true progress would inevitably follow human thought and endeavor. Obsolescence, regarded by many industrialists as an evil result of excessive development, was identified as a sign of true progress. "Hand in hand with progress travels a companion known as obsolescence. . . . Where there is no obsolescence, there is little or no progress. . . ."

U. S. Government Contracts Awarded to Metal-Working Firms

(Awarded from Sept. 23–Oct. 8 inclusive)

Contractor	Gov't. Agency	Commodity	Amount
Riverside Metal Co., Riverside, N. J.	Treasury	Bronze blanks	$39,250
Torrington Mfg. Co., Torrington, Conn.	Navy, S & A	Slab milling machine	41,697
G. A. Gray Co., Cincinnati, Ohio	Navy, S & A	Planer	22,481
Am. Tool Works Co., Cincinnati, Ohio.	War, Ordnance	Lathe	55,000
DeLaval Steam Turbine Co., Trenton, N. J.	Navy, S & A	Pumps	276,990
Warren Steam Pump Co., New York, N. Y.	Navy, S & A	Pumps	61,798
Carrier Corp., Syracuse, N. Y.	Navy, S & A	Refrigerating equipment	37,284
Industrial Brownhoist Corp., Bay City, Mich.	Navy, S & A	Crane	72,964
Michigan Power Shovel Co., Washington, D. C.	Farm Sec. Admn.	Cranes	34,238
York Safe & Lock Co., York, Pa.	War, Ordnance	Gun mounts	1,557,330
Newport News Shipbuilding & Drydock Co., Newport News, Va.	TVA	Hydraulic turbine.	268,830
Henry & Wright Mfg. Co., Hartford, Conn.	War, Ordnance	Primer ins. Mach.	60,423
A. B. Farquhar Co., York, Pa.	War, Ordnance	Press	505,584
Watson-Stillman Co., Roselle, N. J.	War, Ordnance	Presses	79,200
Pratt & Whitney Div., United Aircraft Corp., E. Hartford, Conn.	Navy, S & A	Bearings	48,650

Nash Begins Production As Strike Ends

CHICAGO—After six weeks delay due to labor trouble at Racine, Nash is swinging into production on its 1939 model cars. Settlement of seniority rights differences between C.I.O. locals at Kenosha and Racine last week permitted reopening of the Kenosha plant where Nash-Kelvinator had late in August announced operations would be consolidated until business warranted reopening the Racine plant. While sales of 1937 models had reached a peak of some 80,000 units, sales in 1938 showed a 50 per cent drop so that it was decided to concentrate production operations at Kenosha with a consequent saving of an estimated $300,000 in costs.

At the time of the announcement of this move the 800 employees in the Racine plant who had been preparing the 1939 Lafayette went on strike and pickets stopped the removal of the dies and machinery from Racine to Kenosha.

Lack of the equipment bottled up in Racine plant forced the Kenosha plant and the Seaman Body plant in Milwaukee to close on September 28 with layoffs of 1,200 to 1,500 people in Kenosha and 1,800 in Milwaukee with potential employment of 6,000 when 1939 production got under way.

Rumors at that time flew thick and fast to the effect that Nash would close all of its Wisconsin plants and move out of the state entirely. These were promptly squelched by company officials and negotiations with the state labor board continued on the basis of proposals made by the company. These were that the Racine plant continue operations for 60 days on the manufacture of parts while the seniority rights of workers in both cities were being arranged so that Racine employees could work in the Kenosha plant only ten miles

Arguments between the union locals hinged on the method of figuring seniority rights. Racine calculated on the basis of elapsed time of employment, Kenosha on the basis of elapsed time minus time of layoffs. With a solution of the problem in sight the Seaman Body Corp. reopened about two weeks ago with 800 to 1,000 at work, and 200 began work last week on parts at Racine until such time as the 800 originally employed there could be absorbed at Kenosha. According to an announcement by R. A. Devlieg, general works manager, it is expected that the normal payroll at Kenosha will reach 3,200 and 2,000 at Milwaukee.

DETROIT LETTER

Will Ford announce a 35-hour week and guaranteed income? . . . Chevrolet assembles its 14,000,000th car . . . Advance sales of 1939 cars are unusually heavy, employment gains and the UAW 32-hour week demand may lose force . . . Details of several cars

RUPERT LE GRAND
Detroit Editor, *American Machinist*

DETROIT—Did Homer Martin honor the Ford Motor Company last week with one of his famous exploratory calls, or was he there as the result of a direct invitation?

Observers feel that neither Mr. Martin, Harry Bennett of the Ford service department, or Henry Ford would be likely to consider this visit as purely a social one, despite statements to the contrary. They view the attendant publicity and the fact that the daily press was on hand as indications of a bigger move. It must be remembered that the Ford Motor Company was not the target of the union demand for a 32-hour week.

Mr. Ford's record of capitalizing on a labor situation when others are in difficulties or approaching a stalemate is well known. So why not again? Only a few months ago he made a statement about the desirability of a minimum annual wage and greater security of employment. The Ford plants are now working 40 hours a week, but a voluntary reduction to say 35 hours a week coupled with some sort of wage security would be another coup. It would stymie the union's campaign against him, scotch the unfavorable publicity arising from NRLB badgering and confound the Washington critics. It would tie in very nicely with announcement of the new Mercury, provoke an immediate and friendly reaction from the general public, and sell more cars.

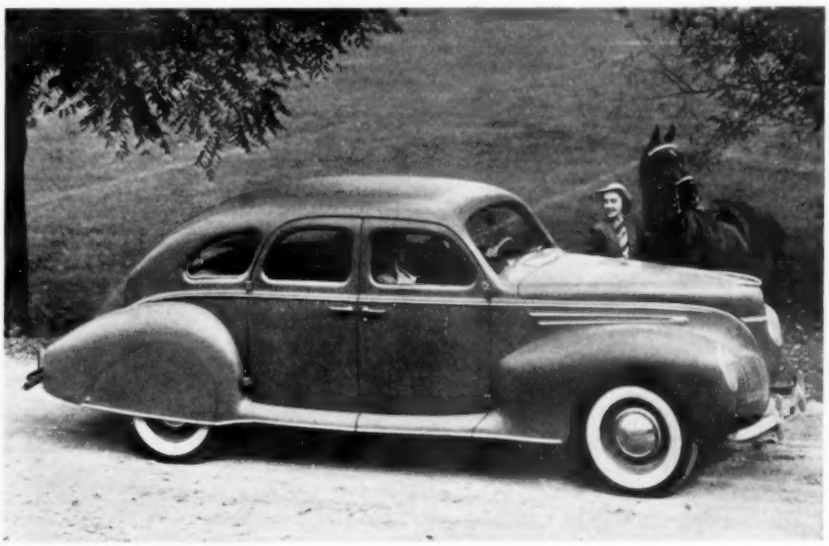
Chevrolet proudly finished its 14,000,000th car at Flint on Oct. 11. It expects to build 35,000 cars by Oct. 22, having been rather slow in starting. September sales through dealers were much better than expected, being over 70,000. Production has been stepped up to stock dealers for the announcement.

Advance sales of 1939 cars are unusually good and have stimulated considerable re-employment. Oldsmobile is working on a two-shift basis and reports that its dealers never before had on hand such a large bank of advance orders. Buick is operating its assembly lines on two shifts and reports retail orders higher than for any announcement period in the last ten years. Chevrolet expects to add 3,000 men before Oct. 24. Employment throughout the General Motors divisions is higher than at any other time this year. These signs of the public's ability to buy new cars and the fact that possibly 300,000 cars are needed for dealer's stocks point to a good fall and winter.

The only hitch just now is the attitude of the UAW with respect to the 32-hour week. Should Mr. Ford have something to say, the picture will be changed over night. At present it appears that there will be no serious strikes, but that the UAW will continue to press where feasible for a 32-hr. week in an effort to get as many of its members back into the dues-paying category as possible. The union's funds sank to an extremely low ebb last summer as a result of unemployment and internal squabbles. The main thing now is to get a working bank balance again, and this necessity will act as a drawback to long drawn out strikes this fall and winter. But it is also hard to whip up public backing when work is offered and refused.

The automotive manufacturers, despite a good outlook, are not yet experiencing a real boom, and they can not employ all of their former men to further the back to work idea. They do have 40 hours of work per week in some cases, but they are not in a position to raise costs by rehiring a large group of men on a 32-hour basis. Experience has been that each Friday they offer the work and the men refuse. In the case of the Plymouth-Briggs affair the payroll lost by 17,000 men not reporting for work at an average of 90 cents per hour amounts to $122,400 on the basis of an 8-hour day. That loss is not an exact amount because of intricate production schedules in the two plants, but at any rate it far overshadows the gain to the union from dues arising from rehiring to meet its 32-hr. week demand.

The most encouraging sign is the abandonment by the Chevrolet Flint local of pushing its demand for the four-day week when it learned that 3,000 men were to be rehired because of increasing production. The whole problem is likely to vanish if the automotive industry enjoys such good



Concealed Running Boards—Lincoln-Zephyr, instead of doing away with the running boards or making them optional, has covered them up by building out the doors. When the door is opened one finds a running board free of mud, ice or signs of wear and weathering

sales that it will find it necessary to increase employment much more as a natural consequence.

Lincoln-Zephyr showed its new models last week. It retains the streamline design pioneered in 1935, but now has an almost vertical front profile and lengthened hood to accentuate the design. Doors now carry extensions at their lower edges to conceal the narrow running boards and keep them clean. The gear shift lever has been shortened and removed from the floor. It operates under the instrument panel, and is out of the way of front seat passengers. All body finishes are again baked and polished enamel. Frame cross members are now attached to the running gear through heavy shear-type rubber mountings so that road noises are not transmitted into the body. The new rear engine mounting, more rigid rear-axle differential housing and a heavier torque tube carried in a rubber bushing prevent other noises from reaching the passengers.

While Lincoln-Zephyr has been announced, Ford is understood to be holding off private previews of the Mercury, the Ford 85 and the Ford 60 until Oct. 24. Public announcement of the Mercury is to follow on the 26th and of the two Fords on the 29th. This will leave only Willys unseen by the public, since its cars will not be available until November.

The Mercury and Ford lines can be expected to bear a strong family resemblance to style-leader Lincoln-Zephyr, but each will no doubt have its own distinctive features. In appearance the Mercury will lean more toward the Zephyr than the Ford, and thus have a sharp high prow-like front and with radiator grilles placed low at the center, the upper portion being smooth. The door construction used on the Zephyr to conceal the running boards is not likely to be carried over to the Mercury. But in other respects this car will be a replica of the higher-priced model so far as practicable for an automobile that will sell in the $900–$1000 price class. As reported previously, it will have a 116 in. wheelbase, hydraulic brakes, and the engine output will not be set at 100 hp. A number of guesses have placed the engine at 105 hp. A more likely supposition is 95 hp. Like the 85-hp. Ford, the Mercury engine may give a few more horsepower under favorable conditions. The body will be several inches wider than the Ford. A two-spoke steering wheel, instead of a three-spoke, is another feature.

How the Mercury is to be merchandised is the subject of much comment. No definite plans have been announced, but it is believed that both Ford and Lincoln dealers will be given an opportunity to sell the new product. Special arrangements will be worked out by the company, but it is believed that a Lincoln-Zephyr-Mercury combination will be one feature of a many-sided dealer plan. Some Ford dealers will not be allowed to handle the Mercury and thereby distract their attention from the main business in hand—selling Fords.

Addition of the Mercury to the Ford output should increase its production possibilities for 1939. From what competitors are figuring on doing during the year, it is estimated that Ford may build in the neighborhood of three-quarters of a million passenger cars, of which the Mercury may account for 50,000 units. If this assumption is correct, the Mercury should make a considerable dent in the lower medium-price field. It is certain to stimulate fiercer competition and may force revisions in plans for 1940 cars.

The Fords and the Mercury are being put together on one final assembly line, and production is being stepped up as fast as possible. Assembly on one line is feasible because cars of varying wheelbase and fittings can be accommodated. The lesson learned from the changeover from the old Model T has been applied with great thoroughness, and maximum flexibility is now the watchword.

Pontiac announced three lines of cars, a quality six, a deluxe six and a deluxe eight. The quality six is pointed toward the lowest price field, and is priced at $820 for the two-door sedan, only slightly above the Big Three. It is mounted on a 115-in. wheelbase and is powered with an 85-hp. engine. The deluxe six and the duluxe eight are both mounted on a 120-in. wheelbase, but the latter has a 100-hp. engine. In these two models the visibility is fully 25 per cent greater than in previous models, because the windshield glass is wider and higher and the corner posts are narrower. This increase in visability is in step with all General Motors cars equipped with Fisher bodies.

Coil springs are used on the front suspension of the Pontiac and variable-rate leaf springs at the rear. A new parallel link arrangement of the steering tierods improves handling because the fulcrum points of the independent front-wheel suspensions and the steering mechanism are now similarly located. Front-seat frames are constructed of steel tubing for lightness and strength. The new transmission is designed for remote control gear shifting, and a new booster spring in the remote control gear shift, now standard, reduces the effort required by the operator as compared with last year. The new clutch employs a shallow, disk-shaped, spring-steel disk with its center removed and slotted radially to form eighteen integral clutch release fingers. This one disk replaces 21 parts.

Dodge is understood to have redesigned the frame and provided an entirely new body for its silver anniversary "Luxury Liner." It emphasizes the trend in all Chrysler cars toward true streamlining, including the sloping rear. A heavier front end on the frame supports the independent front-wheel coil-spring suspensions. The new steering mechanism has neither pitman arm nor drag link, but employs a Y-shaped steering arm moving horizontally, crosswise to the frame. Steering is 28 per cent easier because the ratio has been raised to 18.2. Higher steering ratios are being adopted generally by the industry.

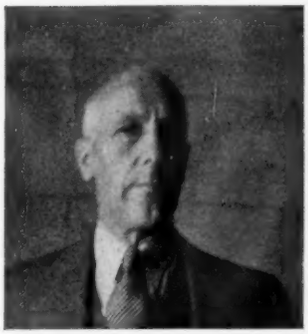
The V-type windshield is mounted between trimmed-down corner posts, is wider and higher, giving 23 per cent more glass area. Better visibility is also secured through wide windows in the sides and rear. Upper hinges of the front doors are concealed, and lower edges of the doors are flared outward to narrow the visible portion of the running boards and to increase the streamlining effect.

Head lamps of the Dodge Luxury Liner are recessed into the forward curves of the fenders, flush with the surface. Tail lamps are set flush with the rear fenders. The new auto-thermic pistons are plated and two of the four rings are likewise plated. Operation of the clutch has been improved by equipping the pedal with an over-center spring. At a certain point the pressure of the spring is added to the operator's foot pressure, thereby easing and speeding the clutch action.

Service Industries to Hold Exhibit in Chicago

DETROIT — The 1938 Automotive Service Industries Show, sponsored jointly by the Motor and Equipment Manufacturers Association, National Standard Parts Association and Motor and Equipment Wholesalers Association, is planned to be held on Chicago's Navy Pier during the week beginning December 5. To date, over 300 companies have reserved more than 900 booths requiring a total of 100,000 sq. ft. of exhibit space.

Among those who took part in the A.S.M.E. Providence Meeting



B. P. Graves, Brown & Sharpe, gave a paper on the electric drive of machine tools

Frank O. Hoagland, Pratt & Whitney, presided at one of the Machine Shop Sessions

W. P. Schmitter, the Falk Corporation, described modern methods of computing gear loads

Herbert S. Indge, Norton Company, discussed numerous methods of lapping and honing

Flood Does Not Prevent Providence Meeting of A.S.M.E.

Dr. Wriston shows fallacy of condemning mechanical progress

PROVIDENCE, R. I.,—One week after receiving a good portion of the Atlantic Ocean in its streets, Providence played host to the quarterly meeting of the American Society of Mechanical Engineers, October 5-7. The city's amazing recovery from flood conditions was explained by James E. Dunne, mayor of Providence, at a get-together luncheon held at the Providence - Biltmore Hotel.

On the same occasion, members and guests of the association were stirred by a vigorous defense of mechanical progress delivered by Dr. Henry M. Wriston, president of Brown University. The speaker effectively laid to rest two false premises that have periodically beclouded economic thinking: the belief that we have reached the state where little future progress can be expected and the belief that a moratorium should be declared on mechanical development until labor adapts itself to the present state of progress. Dr. Wriston showed that through the centuries the same premises had been put forward time and time again, and that upon each occasion they had later proved to be entirely baseless.

Dr. Wriston was introduced by Dr. Harvey N. Davis, A.S.M.E. president, who identified himself as a native of Providence. Dr. Davis now heads the Stevens Institute of Technology.

Much of the credit for the success of the meeting goes to Frederick S. Blackall, Jr., of the Taft-Peirce Mfg. Co., who served as general chairman of the various committees in charge of the sessions.

On Thursday evening a clam bake was held at the Pomham Club, Riverside, R. I. An after-dinner speaker was the Honorable Lewis Johnson, assistant secretary of war, whose address pointed out how "Industry Aids the Army."

Technical sessions were divided into topics to suit the varied interests of the members. Subjects covered were fuels, machine shop practice, rubber, jewelry symposium, industrial instruments, power, textiles, management and iron and steel. The first machine shop practice session was addressed by Paul V. Miller, manager, Small Tool Division, the Taft-Peirce Mfg. Co., and Herbert S. Indge, lapping engineer, Norton Co.

Mr. Miller described practice in thread grinding in the United States and abroad. He covered the practical technique of thread grinding including roughing out the thread as against grinding from the solid and discussed the various means of wheel dressing.

Mr. Indge told of the refinement of ground surfaces by means of honing and lapping. He explained the differences in these two processes, both as regards abrasives and the working pressures used. Specific applications were illustrated by a series of slides.

In the afternoon session, Carl T. Guething, sales engineer of the Heald Machine Co., outlined applications of the borizing process. He showed a number of set-ups in both single spindle and multi-spindle machines, and described the operations performed and several of the advantages to be gained by this method of machining.

Gear design, as influenced by modern loading practices, was the subject of a paper by W. P. Schmitter, assistant chief engineer of the Falk Corporation. Mr. Schmitter described the load carrying ability of various types of gears, showing how each was suitable for specific applications.

The Thursday morning machine shop practice session was addressed by W. E. Johnson, of the Fort Wayne, Indiana, plant of the General Electric Co. Mr. Johnson's topic was, "How Useful Is Your Sense of Proportion?" He compared the creative practical designer with the highly technical man and showed that it was necessary to combine the talents of the two to secure the best design.

B. P. Graves, of the Brown & Sharpe Mfg. Co., told of the application of electric motor drives and controls on machine tools. He outlined the advantages of electric drive and then went into some detail in describing the various means of control. He pointed toward the present progress of compact control units mounted within the machine itself, instead of independent wall mounted panels of large size.

A.S.M.E. members and guests who attended the Providence meeting also had the opportunity of visiting a number of the local industries. Among these were the Brown & Sharpe Mfg. Co., Providence Plant, U. S. Rubber Products, Inc., Gorham Mfg. Co., Esmond Mills, Providence Base Works, General Electric Co., and the Narragansett Brewery.

WATCHING WASHINGTON

Educational orders program headed for important expansion, with an additional item probable . . . President expected to ask next congress for funds to expand and modernize Navy . . . Disturbances loom over wage-hour administration's prolonged silence

McGRAW-HILL WASHINGTON BUREAU
(*Paul Wooton, Chief*)

WASHINGTON—One more item will be added to the six already on the educational orders schedule if this year's program turns out successfully. Its identity cannot be made public as yet. But the educational orders program is headed for important expansion, with the War Department earnestly bent upon clearing the blind spot between blueprints and experience in the making of critical munitions. Next congress almost certainly will be asked for considerable money to extend the program to diverse fields. Now that the Department has taken the plunge into negotiated munitions procurement with educational orders, and has let industry into the defense picture for $15,000,000 worth of ordnance, metal-working men will watch trends with great interest.

Again: Big Navy

And the Navy's champion, President Roosevelt, is expected to ask the next congress for a staggering sum, perhaps twice the appropriation of any recent year; to go ahead with the big navy authorization of the last congress. The program will include construction of two battleships, four cruisers, six destroyers, six submarines; modernization of the aircraft carriers Lexington and Saratoga, five battleships and of six submarines; construction and expansion of shore establishments; and expansion of personnel.

Overtures to Industry!

Navy is leaning further toward industry. Speaking to the board of General Electric, October 10, Assistant Secretary Charles Edison said: "Naval laboratories will not compete with commercial laboratories . . . research work undertaken for us by commercial laboratories will depend on the extent to which the results may or may not promise commercial as well as naval application. . . . In times of emergency of course our relations will be of necessity much closer . . . we could enormously increase the rate of production of naval vessels with much less dislocation of customary effort than would seem . . . possible. . . . Present day conditions do not give a country time to prepare for war. A country to endure must be ready for war. The fate of the nation lies in its great industries. . . ."

DISARMAMENT? NOT YET

American and Canadian manufacturers of every conceivable war product will continue to benefit by the present armament race for several years to come, in the well-considered judgment of Washington's diplomatic observers.

There will not be a successful international conference, these coldblooded students of wars and rumors of wars hold, for some years to come. Certainly not within a period which might cause concern to any factory owner at the present time. Disarmament—or more accurately, armament limitation—may come eventually, but not until quite a few factors in the present setup in Europe are eliminated.

This is true despipte the fact that the Munich conference, in the judgment of these same diplomats, eliminated serious danger of war for at least two years. This is on the theory that there is already a tacit understanding that Germany is to get most of her colonies back, certainly those in Africa and possibly all save those which were assigned to Japan.

As a matter of fact, France has announced, *since* the Munich conference, her proposals with a view to increase her line of defense against Germany. Britain is pushing even more vigorously to get her air force up to the point where it conceivably might be able to resist the German air armada. Russia, announcing nothing, is just as active, according to advices here. Her intense indignation about the alleged Lindbergh statement proves her interest.

Aviation Comes of Age

Aircraft production apparently is on its way to real importance in American and world industry. Two high authorities in Washington told this writer in the last fortnight that Germany's air power was the hole card that won the Nazi-Czech argument. Obviously too, the whole picture of two big-league crises, the New England Flood and the European diplomatic exchange, was profoundly affected by airplanes. Military and fixed-base transport equipment will develop along present basic principles. Government supervision will permit normal profit for business but not for speculators. Private flying, when it comes to life, might do so on radically new design.

Wage-Hour Friction Begins

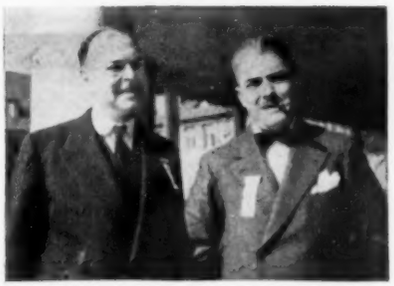
Wage-hour administration and industry are beginning to exchange cross words. The honeymoon will soon be over, as expected. First dander is raised by Administrator Andrews' inability to advise definitely which industries are covered by the law and which are not. He is urged to give opinions, but he doesn't think that would be fair to industry or to himself. So he is standing his ground till his legal staff, limited by lack of funds, can draw up a list which it can hope will stand Supreme Court test. Andrews has divided the country into 12 administrative districts; is ready to appoint a few regional and state directors. So far he has only one industrial committee, textiles, working on above-minimum wage adjustment. Activity will be very limited till more money is authorized by congress in January. Meanwhile, labor lawyers strongly advise all employers to comply with the 25-cent and 44-hour standards, with time and a half for overtime, beginning Oct. 24, unless they are absolutely sure they are not covered.

Two Years of Contracts

Total public awards containing agreements to comply with the Walsh-Healey law, reported from September 28, 1936, the effective date, to Sept. 1, 1938:

Iron, steel and their products, 982 contracts, valuation $50,724,595, 9.15 per cent of total. Nonferrous metals and alloys, 272 contracts, valuation $12,589,945, 2.27 per cent of total. Other machinery, 863 contracts, valuation $37,070,249, 6.69 per cent of total. Transportation equipment, 635 contracts, $63,300,918, 11.42 per cent of total.

R. C. BALL and COL. B. A. FRANKLIN



J. D. CHRISTIAN and WALTER HENRY

C. HAMILTON, HOWARD DINGLE and CHARLES GOEDKE

Tolerance Toward Business Needed Col. Chevalier Tells A.G.M.A.

Technical topics also discussed at gear manufacturers meeting

SKYTOP, PA.—Business is not something set apart from the people of a nation, but it is the people themselves in the act of making a livelihood. Such was the keynote of an address by Col. Willard Chevalier, vice-president, McGraw-Hill Publishing Co., at the 21st semi-annual meeting of the American Gear Manufacturers Association held at Skytop, Pa., October 10-12. Much of the anti-business feeling, said Colonel Chevalier, has been promoted by those seeking to change the basis of our economic system. He predicted that such a change was not desired by the great majority of people and that relief from the current castigation of business would follow a better public understanding of its problems. Colonel Chevalier was introduced by Howard Dingle, president of the Cleveland Worm & Gear Co. and of the A.G.M.A.

Three perfect days in the Poconos were enjoyed by members and guests with an attendance equaling the association's previous high mark. Papers on business and technical topics were interspersed with the sports events afforded by Skytop Lodge, scene of the meeting.

Col. B. A. Franklin, industrial business counsel, in a talk on relations, showed that world affairs today affect the worker. Sound industrial relations depended, he said, on gaining the workers' friendship, and he gave some suggestions for bringing this about.

Among the technical topics was "Application of Bronze to Worm Gearing" by J. A. Hatch, McCallum Hatch Bronze Co. Mr. Hatch classified the various gear bronzes and explained how the wrong material was frequently selected on the basis of strength whereas a low coefficient of friction was often the controlling factor.

Noise, that ever elusive bugaboo of the gear engineer, was discussed by R. S. Davidson, General Electric Co. Mr. Davidson told of the nature of noise and practical methods for its control.

M. Scott Hancock, Westinghouse Electric & Manufacturing Co., had for his subject "Characteristics of General Purpose Motors." This speaker described the various motor types, both a.c. and d.c., and the properties that made them suitable for specific applications.

Another speaker from the same concern was R. S. Marthens, who outlined the "Characteristics of Gear Motors." Mr. Marthens showed that standardized units had won for themselves a wide field of application and gave many examples of typical installations.

Rounding out the subject of motors, N. L. Hadley, General Electric Co., gave a paper on the "Control of General Purpose Motors. This author stressed the many devices now used to protect both the worker and the equipment in motor operation.

Two commercial papers were delivered respectively by A. G. Hopcraft, Cleveland Worm & Gear Co., and W. H. Compton, W. H. Compton & Co. Mr. Hopcraft's subject was "Buying and Selling," while Mr. Compton spoke on "Costs and Profits."

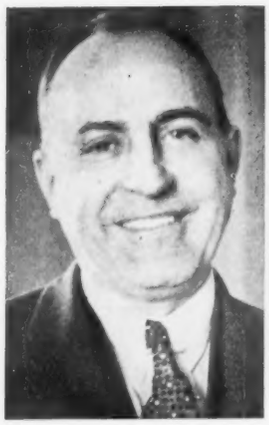
A plan for coordinating an A.G.M.A. employee training system was presented by Russell C. Ball, Philadelphia Gear Works, chairman of the Industrial Relations Committee. Designed specifically for the small concern, the proposed program called for an eighteen-month training period and the issuance of an A.G.M.A. certificate to show that the learner had successfully completed his course.

H. H. KERR

T. R. RIDEOUT

W. E. FISHER

J. C. McQUISTON U. SETH EBERHARDT



W. B. HURLEY

DAVID BEECROFT

W. J. DAVIDSON

W. J. Davidson Selected to Head S.A.E. Throughout Coming Year

NEW YORK—W. J. Davidson, general sales manager of the diesel engine division, General Motors Sales Corp., has been nominated for president of the Society of Automotive Engineers for 1939. Treasurer for the society during the same term will be David Beecroft, of the Bendix products division, Bendix Aviation Corp.

Three additional councilors, who will serve for the next two years, have also been nominated. They are W. E. McGraw, chief engineer, Chrysler Corp. of Canada; G. L. Neely, research engineer in charge of fuels and lubricants, Standard Oil Company of California; and A. L. Beall, research engineer, Wright Aeronautical Corp. Also serving on the council through 1939 will be the following three men, who were elected in 1938: L. J. Grunder, Richfield Oil Corp.; B. J. Lemon, U. S. Rubber Products, Inc ; and W. J. Davidson, General Motors Sales Corp. Also serving on the 1939 Council as past presidents are Harry T. Woolson, Chrysler Corp., and C. W. Spicer, Spicer Mfg. Corp.

Nomination of ten vice-presidents for the coming year was also announced by the society. Each concerned with a separate phase of the automotive industry, they comprise:

Aircraft—William Littlewood, engineering vice-president, American Airlines, Inc.

Aircraft-Engine — H. K. Cummings, chief of the automotive power plants section, National Bureau of Standards.

Diesel-Engine—F. G. Shoemaker, chief engineer, Detroit Diesel Engine Division, General Motors Corp.

Fuels & Lubricants—A. G. Marshall, manager of technical applications, Shell Oil Co.

Passenger-Car—John G. Wood, assistant chief engineer, Chevrolet Motor Div., General Motors Corp.

Passenger-Car-Body—I. L. Carron, body engineer, Dodge Bros. Div. of Chrysler Corp.

Production—W. B. Hurley, staff engineer, Detroit Edison Co.

Tractor & Industrial Power Equipment—J. S. Ehksine, engineer, International Harvester Co.

Transportation & Maintenance—Harry O. Mathews, automotive engineer, Public Utility Engineering & Service Corp.

Truck, Bus & Railcar—Carl J. Bock, General Motors Truck & Coach Div., Yellow Truck & Coach Mfg. Co.

Roth Welding Acquired by Federal Machine & Welder

DETROIT—The Roth Welding Engineering Co. has been purchased by the Federal Machine & Welder Co., as a result of negotiations during the month of August. The former Roth plant will be operated as a branch so as to serve customers in the Detroit area.

The Roth firm numbered among its assets a patent on the "Ultra-Speed" spot welder. This machine is capable of welding a large number of spots per second, while requiring a transformer of only small capacity. The company had licensed the Taylor-Winfield Corp. of Warren and the Thomson-Gibb Electric Welding Co. of Lynn, Mass., in addition to Federal Machine & Welder, to manufacture under the patent.

Safety Congress Attracts Nine Thousand

CHICAGO—Management's increasing interest in safety and welfare of employees was aptly demonstrated in the Silver Jubilee of National Safety Congress held in Chicago the week of October 9 where more than 9,000 were registered for the various sessions and visited the exhibit of safety devices.

Among the speakers was T. M. Girdler, Republic Steel Corp., who spoke on "Twenty-Five Years of Safety in Steel." Charles R. Hook, American Rolling Mill Co., talked of the relation of industrial safety to the business of today.

C. S. Ching, U. S. Rubber Products Co., addressed the automotive and machine shop section on "Modern Trend of Industrial Accidents." "Selling Safety to the Man on the Job" was the subject of a talk by Harry G. Booth, vice-president, Plymouth Division, Chrysler Corp. At a joint meeting with the Power Press Section a panel on metal trades accident problems proved particularly interesting, participated in by W. H. Jarvis, Chase Brass & Copper Co., John Kerrigan, Highland Park Plant, Chrysler Corp.; J. C. McDonald, Fisher Body, Pontiac Division, General Motors; B. E. Rockhoff, Detroit Steel Products; and R. A. Shaw, Murray Corp. of America. A separate session of the Power Press Division heard a talk by M. R. Zelder, Edison General Electric Appliance Co., on "Eliminating the Personal Causes of Power Press Accidents." Louis Boraks, Liberty Mutual Insurance Co., spoke on "Eliminating Mechanical Causes of Power Press Accidents."

D. D. Fennell, vice-president, Burton-Dixie Corp., was reelected as president of the National Safety Council. Among the vice-presidents elected for the coming year are: C. W. Dempsey, Liquid Carbonic Corp.; Frank N. Harrison, International Harvester Co.; A. V. Rohweder, Duluth, Missable & Iron Range Railway Co.; R. T. Solenstein, Elliott Service Corp.; A. W. Whitney, National Conservation Bureau. W. H. Cameron continues as managing director.

W. R. Beechill, Chrysler Corp., succeeds L. B. Loomis, Ternstedt Mfg. Div., General Motors Corp., as chairman of the Automotive and Machine Shop Section. Mell E. Trammell, Republic Steel Corp. succeeds R. A. Chaffin, Continental Steel Corp., as chairman, Metals Section. B. E. Rockhoff, Detroit Steel Co., succeeds H. C. Howsam, Hubbard Spool Co., as chairman, Power Press Section.

A. G. Bryant Reelected President of Associated Machine Tool Dealers

"Creative selling" as opposed to "competitive selling" stressed at organization's annual convention in Cincinnati

CINCINNATI—Better selling of machine tools was the main theme at the annual convention of the Associated Machine Tool Dealers of America at the Hotel Alms October 10-11. The attendance was one of the largest in the association's history.

A. G. Bryant, Bryant Machinery & Engineering Co., Chicago, was reelected president of the association; John Sauer, Jr., Peninsular Machinery Co., Detroit, vice-president; and E. P. Essley, the E. L. Essley Machinery Co., Chicago, secretary-treasurer. Three new members were elected to serve on the executive committee for a three-year term: William T. Todd, Jr., Somers, Fitler & Todd Co., Pittsburgh; George Habicht, Marshall & Huschart Machinery Co., Chicago; and John Cetrule, Triplex Machine Tool Corp., New York City.

"The market for capital equipment no longer is based upon a constantly expanding economy in the sense of more plants and facilities to be built. Now the market depends more on higher efficiencies for existing plants. The chief need is to replace existing equipment and facilities," said Mason Britton, vice-chairman, McGraw-Hill Publishing Co., Inc., New York, in an address at the annual banquet.

Mr. Britton told the association members that "you have got to develop the sales facilities, sales organization and sales technique required to sell successfully in a replacement market. I call this creative selling as against competitive selling." He observed that "there are too many untrained salesmen, who are mechanics and engineers, selling machine tools, when what you need is good mechanics and good engineers who are also trained salesmen." The greatest problem of the industry is to train better salesmen to meet the new conditions.

A. G. BRYANT

Colonel H. A. Toulmin, Jr., Dayton, Ohio, outlined to the members at the dinner the vital part that the machine tool industry will play in case the United States should go to war. He pointed to the huge job ahead of this country in mechanizing the army, in redesigning and building efficient tanks for war service and in preparing the nation's defenses and in mobilizing industry for "the inevitable world conflict" into which the United States will be drawn.

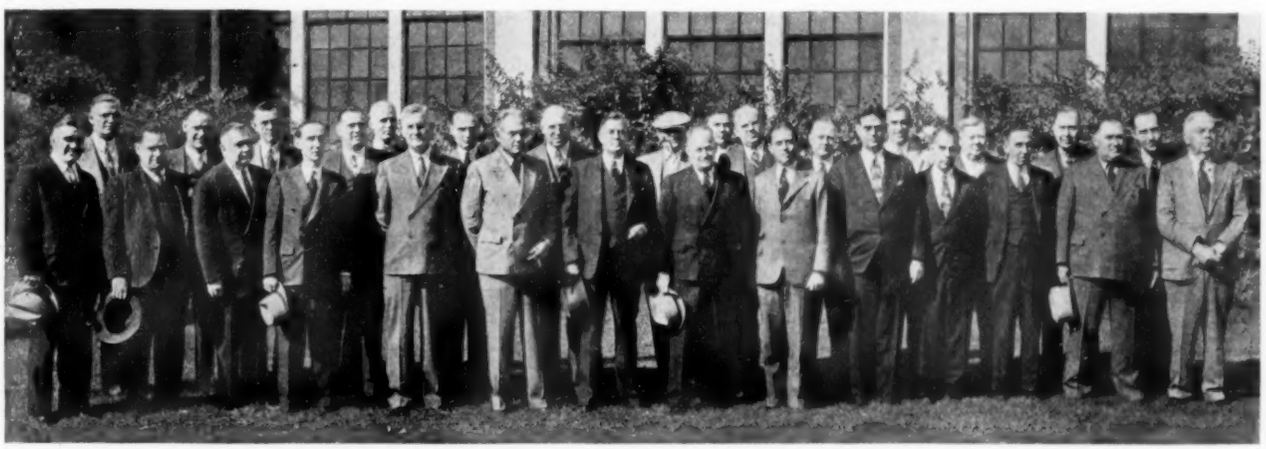
At the general session Walter E. Blank, foreman of the toolmaking department of National Cash Register Co., Dayton, Ohio, described the requirements of his department from a machine tool standpoint. Much of what Mr. Blank said has already been published in the editorial pages of *American Machinist*.

Discussion of sales problems occupied a good part of the general session. A one-act melodrama "Salesman Save That Order!" caused much hilarity. It was put on by J. F. Owens, J. F. Owens Machinery Co., Syracuse, N. Y., as the hero, and F. W. Schiefer, F. W. Schiefer Machinery Co., Rochester, N. Y., as the villain. George R. Ray, Marshall & Huschart Machinery Co., Chicago, spoke on "Simplified Sales Control" and L. H. Pratt, Henry Prentiss & Co., Inc., New York, on "Approaching the 'Sales Clinic' From the Northeast."

Howard Dunbar, vice-president, Norton Co., brought greetings to the dealers from the National Machine Tool Builders' Association of which he is president. Tell Berna, general manager of the Builders' Association, also brought a timely message to the dealers. William J. Radcliffe, the E. A. Kinsey Co., Cincinnati, welcomed the association to the Queen City. Walter W. Tangeman, vice-president, Cincinnati Milling Machine Co., was unable to appear on the program because of illness. One meeting was devoted to an executive session for members only. Mr. Bryant ably presided at all the sessions.

Continuing on the executive committee are Harry Barney, Barney Machinery Co., Pittsburgh; E. R. Motch, Jr., Motch & Merryweather Machinery Co., Cleveland; A. S. Bush, Charles A. Strelinger Co., Detroit; Charles E. Moore, Moore Machinery Co., San Francisco; H. E. Oatis, The National Supply Co., Toledo, Ohio; F. Rodger Lindsay, Swind Machinery Co., Philadelphia; and Mr. Schiefer.

Members of the Associated Machine Tool Dealers made an inspection trip through the Cincinnati Milling Machine Co. as part of their program. Frederick V. Geier, Cincinnati Milling's President, is shown here with the dealers



Jap Manufacturers Given Drawings to Make Standard Machine Tools

TOKYO—The Machine Tool Manufacturing Industry Law of Japan, under which the "big five" machinery builders in Nippon are currently receiving their first subsidy checks, has called forth a considerable amount of criticism from small makers to which the provisions of the law do not apply.

The Tokyo legislators had obviously overlooked the fact that the small makers account for at least half the nation's machine tool production and that therefore the big scheme to boost output was only a partial solution to Japan's self-sufficiency problem.

Detailed investigation has revealed that many of the small machinery builders have developed excellent engineering technique and have a competent labor force at their disposal. On the other hand, their limited capacity for each given machine unit precludes contract work for the fighting services, which require a great number of identical models.

It is now hoped to find a way out of these difficulties by distributing drawings of standard designs to all of these makers, in the hope that their aggregate capacity will substantially add to the supply of munitions machine tools.

It was in February, 1935, that the defunct Resources Bureau of the Cabinet first discussed the development of standard designs to assist in the national mobilization. Engineers of the "big five" machinery works, university professors and government officials worked together. Designs were submitted to Army and Navy arsenals for approval, alterations and improvements suggested, and finally, in March, 1937, tentative manufacture started by the five big machinery firms.

The standard specifications cover three sizes of engine lathes, radial and vertical drilling machines, horizontal, vertical and universal milling machines and a shaper. The recent decision of the Planning Bureau of the Cabinet, to make blueprints of these models available to bona fide manufacturers at prices ranging from $3 to $10 per unit has relieved the small builders of many of their worries. It is said that already 300 applications have been filed.

As a further step to put to better account the productive capacity of the smaller industrialists, it is planned to have several of them cooperate in the production of a given model.

Index of Machine Tool Orders

Based on Volume of Shipments for 1926

	Month	Index of Orders	3 Months' Average Index
1937 —	September	210.7	187.2
	October	152.0	180.8
	November	127.7	163.5
	December	142.7	140.8
1938 —	January	118.4	129.6
	February	75.7	112.3
	March	107.0	100.4
	April	90.3	91.0
	May	66.7	88.0
	June	70.2	75.7
	July	89.6	75.5
	August	120.9	93.6
	September	117.4	109.3

EDWIN R. RATH

Edwin R. Rath Joins Power Transmission Council

BOSTON—The Power Transimission Council, Inc., has announced the appointment of Edwin R. Rath as chief engineer. For the past four years Mr. Rath has been head of the Department of Industrial Research of the University of New Hampshire, in which capacity he has rendered consulting engineering service to the manufacturers of that state. Since his graduation from the University of Pittsburgh in 1921, Mr. Rath has had wide experience with various commercial firms as an executive on sales development.

James Adams, Jr., has also been added to the council staff. In addition to preparing the club program talks for the coming season, he will also conduct an extension course for those members of the power transmission industry who feel the need for additional information. Mr. Adams has been employed by several industrial firms on the layout and construction of large plants.

W.P.A. Spends Over 27 Million for Machinery

WASHINGTON—Machinery and mechanical equipment valued at $27,303,000 was purchased for projects of the Works Progress Administration during its first three years through June 30, 12938, according to statistics compiled from U. S. Treasury and WPA sources. This sum was divided as to type by purchases amounting to $14,192,000 for electrical machinery, apparatus and supplies; $926,000 for paving machinery and equipment; and $12,185,000 for other machinery and equipment. The total amounted to nearly four per cent of all the purchases of material made from WPA projects. All buying was done through the procurement division of the Treasury Department after open competitive bidding.

In addition, the WPA and local sponsors of projects have paid out an estimated $130,000,000 for rentals and services supplied in the use of various types of machinery and equipment, the replacement of which presents a potential market.

Rockford Tool Engineers Celebrate First Anniversary

ROCKFORD — Tool engineers from Rockford, Beloit and Freeport gathered here the night of September 29 for the celebration of the first anniversary of the founding of the 12th chapter of the American Society of Tool Engineers. More than 200 attended the banquet which celebrated the growth of the organization from a handful of men to its present membership of 180 in one year. Guests at the speakers table included Ralph E. Flanders, Jones & Lamson Machine Co.; Ford Lamb, executive secretary, A. S. T. E.; Charles Brown, mayor of Rockford; A. M. Johnson, president, Barnes Drill Co.; George C. Purdy, president, Greenlee Bros. & Co.; Harry A. Severson, vice-president and general manager, Barber-Coleman Co.; G. C. Gridley, works manager, Mechanics Universal Joint Co.; E. W. Dickett, Sundstrand Machine Tool Co., president of the local chapter, acted as toastmaster.

Following the banquet about 400 men viewed the table exhibits of fifteen manufacturers and attended the meeting which was addressed by Mr. Flanders on the subject "Pioneering in the Tool Industry" and by Ford Lamb on general problems of the society.

Foreign Trade Convention To Include Machinery Group Meeting

WASHINGTON—The National Foreign Trade Council is preparing to conduct a number of group discussion meetings at the annual National Foreign Trade Convention to be held at the Hotel Commodore in New York City from Oct. 31 through Nov. 2. Outstanding among these group meetings will be the one devoted to the foreign trade interests of the machinery industry.

Lewis M. Lind, chief of the machinery division of the Bureau of Foreign and Domestic Commerce, is in charge of preparations for the meeting and will assist in conducting the discussions. He has planned to have the machinery group meeting at a time when there will be no other sessions in which members of the industry might wish to participate.

PERSONALS

WALLACE K. BROWN has been appointed vice-president and general sales manager of the Crocker-Wheeler Electric Mfg. Co., according to an announcement by B. D. CHRISTIAN, vice-president.

FRED V. GARDNER has been elected acting treasurer of the Chain Belt Co., filling the vacancy created by the recent death of C. L. PFEIFER. Mr. Gardner, who has been connected with the company since early in the year in a consulting capacity, was formerly associated with the General Electric Co. He is a graduate of the University of Missouri and of the Harvard Business School.

YALE D. HILLS, formerly Los Angeles territory branch manager, Timken Roller Bearing Co., has been made manager of distributor sales for the company's service-sales division. Mr. Hills' new headquarters will be at the main Timken factory in Canton, Ohio.

W. G. JERREMS, III, formerly assistant superintendent of Douglas Aircraft Co., has been appointed personnel director of the company and its subsidiaries. He will also carry out the organization's industrial relations programs.

C. N. KIRKPATRICK, secretary and sales manager of the Landis Machine Company, sailed October 8 to visit the company's representatives in England and on the continent.

WALTER E. MARBLE, after 47 years with the D. A. Stuart Oil Co., manufacturer of industrial oils, was given a testimonial dinner by the company in honor of his 80th birthday.

CHARLES E. MCINTYRE has been named assistant sales manager at the Cleveland district sales office of the Carnegie-Illinois Steel Corp.

KIRKE W. CONNOR

KIRKE W. CONNOR, president of the Micromatic Hone Corp., sailed Oct. 6 on the *Queen Mary* for a six to eight weeks trip to Europe. He will speak before several engineering groups on the subject of new developments in surface finishes. His audiences will include aircraft, production and automotive engineers in Great Britain. Visits will also be made to Micromatic dealers and users in England, and possibly in France, Germany and Russia.

VICTOR A. HANSON has resigned as vice-president and chief engineer of the Power Transmission Council to accept a position with the Whitney Chain Co.

PAUL W. RHAME has been named general manufacturing manager; JOSEPH A. ANDERSON, assistant general manufacturing manager; and EDWARD D. ROLLERT, process engineer; A. C. Spark Plug Div., General Motors Corp., according to an announcement by L. G. GOAD, AC general manager.

Mr. Rhame became connected with the company in 1922, being employed in the product engineering department. After a few months, he had become chief inspector, and in 1934 was appointed assistant manufacturing manager.

Mr. Anderson became associated with the organization in 1924, serving as foreman and superintendent of the inspection department. Shortly afterwards, following a year in the efficiency department, he became process engineer.

Mr. Rollert came with the company in 1934, being employed in mechanical engineering work. The following year he became a departmental metallurgist, later becoming assistant process engineer, the position he held at the time of his recent promotion.

F. C. RUSSELL has been named general sales manager of the H. H. Robertson Co., Pittsburgh, manufacturer of pre-fabricated building products.

W. S. SHIPLEY, president of the York Ice Machinery Corp., was elected president of the Refrigerating Machinery Association at its annual meeting in Montreal. J. I. LYLE, president of the Carrier Corp., was elected first vice-president.

W. STUART SYMINGTON has been elected president and general manager of the Emerson Electric Mfg. Co. He will tinue as chairman o the board. RAYMOND E. OTTO has been named manager of motor sales, while E. L. SPLITSTONE has been elected chief engineer. Mr. Splitstone replaces J. A. RODGERS, who resigned last April.

CARL W. VOLLMANN, president of the Linde Canadian Refrigeration Co. and for half a century prominently identified with the refrigerating machinery industry, was elected an honorary member of the Refrigerating Machinery Association at its annual meeting in Montreal.

BERT L. WOOD, formerly of the Carnegie-Illinois Steel Corp., has been placed in charge of the American Iron & Steel Institute program for the promotion of the broader use of light steel for building construction.

BUSINESS ITEMS

Bohn Aluminum & Brass Corp. announces the resignation of DAVID E. ANDERSON as Chief Engineer.

The Edward G. Budd Mfg. Company has received an order from the Burlington Lines for the ninth lightweight, stainless steel train to be added to the Zephyr fleet. The new unit will embody the same type of construction as previous Zephyrs, but will include new operating appliances and conveniences. Its 1,000-hp. diesel engine will be built in the plant of the Electro-Motive Corp.

Among the new features of the train will be a self-contained power unit in each car for supplying light, air conditioning and heating power requirements. This unit will consist of a small diesel engine direct-connected to a generator mounted in a sound-proof compartment beneath the car. Another innovation will be a new braking system developed by the Budd Company, which entirely eliminates the usual brake shoes.

The Spencer Lens Co., Buffalo manufacturer of microscopes and other scientific instruments, has started construction on a new building to be used for the manufacture of mechanical parts. Providing well over 100,000 sq. ft. of available floor space, the new building is expected to be completed within the next five months.

Trans-America Aircraft & Motor Corp. has rented space in the Buffalo plant of the Consolidated Aircraft Corp. for the manufacture of a line of diesel engines for airplanes. Production of experimental models of the new engine will begin immediately, according to CHARLES A. BALTON, vice-president of the new company and designer of the engine.

The Victor Electric Co., Cincinnati manufacturer of electrical appliances, has acquired the plant of the J. A. Fay & Egan Co., woodworking machinery manufacturer. One of the largest in the Cincinnati district, the structure provides 125,000 sq. ft. of floor area and covers more than eight acres of ground. It is understood that acquisition of the plant was made necessary by increased business and plans of the company to extend its activities into other allied fields.

The Board of Directors of the American Standards Association has decided to station a permanent staff representative in Buenos Aires to promote the South American adoption of industrial standards now accepted by American industry. This work will be carried out with the cooperation of the American Chamber of Commerce at Buenos Aires which is vitally interested in the project.

L. H. Gilmer Co., Philadelphia belting manufacturer, announces the establishment of a new factory branch in Chicago. The new office will be under the supervision of A. B. MACFARLAND, for five years assistant to the sales manager.

Inland Steel Company has licensed the Carnegie-Illinois Steel Corp. to produce its new lead-bearing steels, according to an announcement made at the Inland offices. First announced by Inland last May, the new steel has been produced in hot rolled form under the trade name "Ledloy." It is expected that Inland will grant similar licenses to other steel companies in the near future.

The Indianapolis Machinery & Supply Co., Indianapolis, has been appointed distributor of the line of New York Belting & Packing Co. mechanical rubber goods, according to an announcement by B. F. RUETHER, general manager of the latter company.

Ten members of the Institute of Vitreous Enamelers of England arrived in New York City on October 9. Arrangements have been made for the visitors to make a tour of the porcelain enameling plants in the United States and to meet with the representatives of the industry at the third annual Porcelain Enamel Institute forum.

Martin & Schwartz, Inc., Buffalo manufacturers of gasoline handling equipment, have installed about $10,000 worth of additional machine shop equipment.

Pioneer Engineering & Mfg. Co., Detroit, manufacturer of coolant and lubricant pumps, announces the appointment of Harris Pump & Supply Co., Pittsburgh, as representative for its products.

Thomas Prosser & Son, New York City, has been appointed exclusive distributor for the United States for the newly developed "Radicon" worm gear reducer manufactured by David Brown & Sons, Ltd., Huddersfield, England. WILDRED DUXBURY, who has been in charge of the gear department of the English concern, has joined the staff of Thomas Prosser & Son to help handle the "Radicon" line.

The Scientific Supplies Co., Seattle, Wash., has been appointed exclusive northwestern representative for the line of industrial ovens and furnaces manuactured by the Despatch Oven Co., Minneapolis, Minn.

The Webster Mfg. Co., Tiffin, Ohio, which for the past year has been operating under a trusteeship, has been notified that its reorganization plans have been approved by the Federal District Court. Final reorganization will be effected within the next month or so.

The new company will be known as Webster Manufacturing, Inc., and will remain under the present management.

FRANK B. McMILLIN

OBITUARIES

FRANK B. MCMILLIN, president of the Hydraulic Press Mfg. Co., died at his home in Mount Gilead, Ohio, at the age of 69.

Associated with the company since 1900, Mr. McMillin advanced through the various managerial offices until he reached the presidency in 1935. During this period, the company progressed from a small maker of fruit presses to one of the most prominent manufacturers of hydraulic presses in the industry.

ROBERT FRANKSTON, vice-president of the Boss Mfg. Co., Cincinnati washing machine manufacturers, died Oct. 12 at his home in Evanston following a heart attack. 56 years old, he had served as sales manager of the company until he was made an official five weeks ago.

WILLIAM C. GUBBINS, secretary and treasurer of the Berger Mfg. Co., a subsidiary of Republic Steel Corp., died of a heart attack at his home in Canton, Ohio.

JOHN J. HENNESSEY, reputed to be the oldest member of the American Railway Association, died at his home in Milwaukee at the age of 91.

WILLIAM L. HERTZER, 78, treasurer of the National Machinery Co., and of the Loomis Machine Co., Tiffin, Ohio, died on September 30 in that city of a heart disease.

B. A. LINDERMAN, head of Linderman Devices, Inc., and chairman of the board, Muskegon Machine Co., died October 9 in New York City. He was 67 years of age.

Mr. Linderman was the inventor of much special woodworking machinery and during the war was engaged in the manufacture of several types of gun mounts.

WILLARD C. MCNITT, 57, president of the American Utensil Co. and a prominent Chicago attorney, died suddenly on Oct. 11. During the war, Mr. McNitt was general counsel for the U. S. Shipping Board Fleet Corp., and in addition to organizing his own company was the designer of various types of canning machines.

DANIEL T. TIMBERLAKE, inventor of one of the first successful systems of four-wheel brakes for automobiles, died Oct. 11 of a heart ailment. He was 84 years old.

G. T. WARREN, Atlanta refrigeration equipment manufacturer, died October 6 at the age of 78.

MAJOR GENERAL OSCAR WESTOVER, chief of the Army Air Corps, lost his life in an airplane accident at Burbank, Calif.

Born in 1883, General Westover entered the army as an enlisted man in 1901 and served with the 3rd Battalion of Engineers until 1902 when he entered West Point as a cadet. He completed his training at the U. S. Military Academy in 1906 and was assigned to the 14th Infantry. He later served as assistant professor of drawing at West Point.

During the war he was promoted to the grade of Major and assigned to the Bureau of Aircraft Production, later being promoted to the rank of Lieutenant-Colonel in 1918. The same year he was appointed assistant executive, Bureau of Aircraft Production, and the following year was appointed executive in the office of the chief of air service.

After his graduation from the Air Corps primary and advanced flying schools in Texas, General Westover was assigned as executive officer at Langley Field, Virginia. After further extensive training, he received his appointment as assistant chief of the Air Corps in 1932, with the rank of Brigadier General, later being appointed chief of the Air Corps with rank of Major General.

HENRY H. ARNOLD, formerly Brigadier General, took over the duties as chief of Air Corps, following General Westover's burial in the Arlington National cemetery.

MEETINGS

AMERICAN MANAGEMENT ASSOCIATION. Production conference, Hotel Pennsylvania, New York City, Nov. 9 and 10.

NATIONAL AUTOMOBILE SHOW, Grand Central Palace, New York, N. Y., beginning Nov. 11.

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION, Annual Meeting, Oct. 24-28. Palmer House, Chicago. J. W. DONALD, managing director, 155 E. 44 St., New York City.

NATIONAL FOREIGN TRADE CONVENTION. Machinery group meeting, Hotel Commodore, New York City, Oct. 31-Nov. 2. Group program chairman: LEWIS M. LIND, Machinery Division, Bureau of Foreign and Domestic Commerce, Washington, D. C.

PORCELAIN ENAMEL INSTITUTE. Eighth annual meeting and sales conference, Hotel Statler, Cleveland, Nov. 16-17.

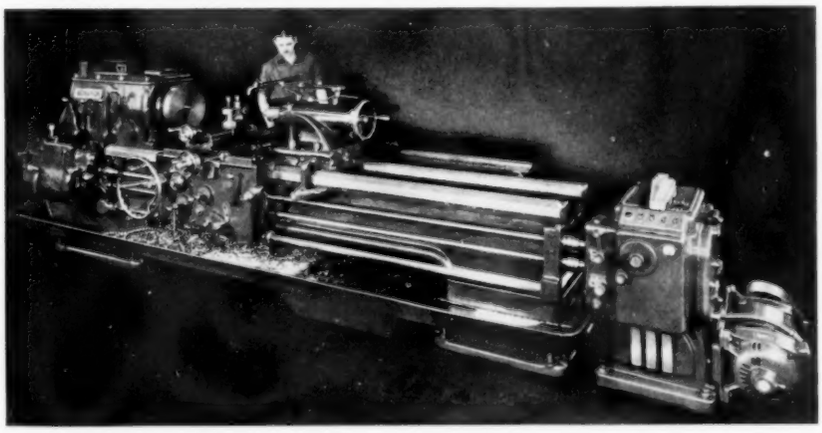
SOCIETY OF AUTOMOTIVE ENGINEERS. Annual Dinner, Commodore Hotel, New York, N. Y., Nov. 14.

National transportation engineering meeting, Commodore Hotel, New York, N. Y., Nov. 14-16.

SHOP EQUIPMENT NEWS

Monarch Offers "Automatic Sizing" Control To Convert Lathes Into Automatic Machines

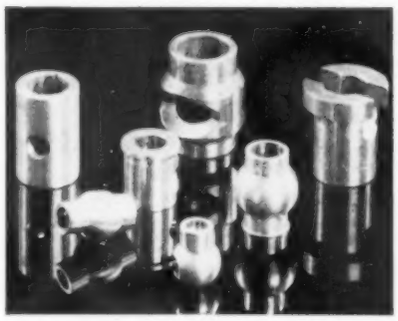
Essentially a new type of control for Monarch engine and toolroom lathes, "Automatic Sizing" developed by the Monarch Machine Tool Co., Sidney, Ohio, converts them into automatic machines for producing parts in quantities of two pieces or more. The control makes it possible to automatically perform such operations as step turning, step boring, step facing, or any combination of step, taper and contour turning, boring or facing. Actual time for the complete set-up to do various jobs varies from approximately 5 to 15 min. and, since the time is short, most lathe work can be done economically by "Automatic Sizing" even though lot is small.



After engaging the proper switch on the control panel and starting the cut, the operator is free to attend a second machine. His only duties are to load and unload the machine and return the carriage to the starting point, either manually or by carriage power rapid traverse. Sizing controls are located between the flexible length-feed and cross-feed couplings and the motor generator set. This set, which is a standard part of each of these control units, furnishes 15-volt current to the micro-sizing switch and 115-volt current to the feed magnet clutches and brakes. Levers are provided for disengaging the length feed to the carriage, which may be in either direction, and for disengaging the cross feed to the tool slide, which may be in or out as desired. A red signal light is provided to indicate the end of each machining cycle.

Diameters or lengths are duplicated within + or — 0.002 in. Diameter gage blocks or micrometer gage blocks may be used, but where work repeats frequently a solid metal template for all diameters and lengths is recommended to save set-up time. Diameter gage blocks need not be hardened, as the pressure of the micro-sizing switch does not exceed 2 or 3 oz. and the wear is negligible.

Power unit is driven by a 4-to-1 d.c. variable speed motor and four pick-off gears provide four feeding ranges. The feed index plate shows a feeding rate of 0.665–23.958 in. per min. for the length feeds and from 0.244–8.8 in. per min. for the transverse feed. A rheostat gives a quick change of feeds in any one of the four ranges. The accompanying illustration shows an "Automatic Sizing" control unit applied to a 20 x 72 in. Monarch lathe.



Johnson "Ledaloyl" Bearing Bronze

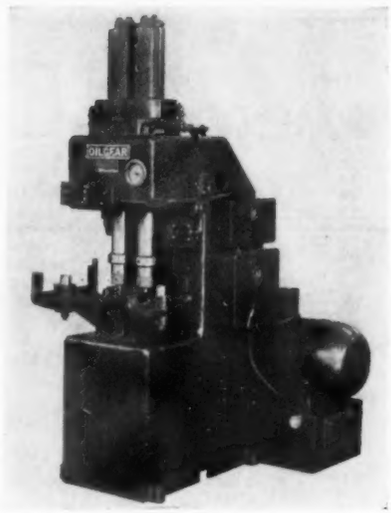
"Ledaloyl" self-lubricating bearing bronze, recently announced by Johnson Bronze Company, 515 S. Mill St., New Castle, Pa., can be classified, primarily, as a sintered type. An exclusive process of pre-alloying the base metals permits the introduction of lead and is claimed to impart characteristics not previously available. In the manufacturing process, a certain amount of volatile material is included that later gives the bearing a porous character. By submersion in vacuum tanks, these pores are filled with oil of a viscosity to suit the application. They are said to retain up to 35 per cent of oil by volume. Capillary structure of the bearing permits a constant flow of oil to the shaft when needed and absorption when not in use. The combination of lead and graphite in the alloy, plus the oil content, is said to produce a satisfactory self-lubricating bearing.

Oilgear 40-Ton Riveting Press

Right- and left-hand front spring seats and steering knuckle support arms are riveted together in assembly on this 40-ton twin-ram riveting press and fixture developed by the Oilgear Co., 1319 W. Bruce St., Milwaukee, Wis. Two 20-ton vertical cylinders are mounted at $5\frac{13}{16}$ in. centers in the rigid gooseneck frame and are connected in parallel to upset two $\frac{3}{8}$-in.

diameter cold rivets simultaneously. Depressing the double pushbutton safety control brings the two rams down simultaneously to force the parts together against pressure pads and upset the two rivets.

The Oilgear Type CG-1225 pump is direct connected to a 10 hp. motor and provides fluid power to the cylinders through a solenoid-operated control valve. Adjustable pressure reversal is provided through a knockout cylinder and limit switch. Specifications: maximum length of adjustable stroke, 8 in.; daylight, 18 in.; height, 102 in.; distance from front to back, 59 in.; distance from right to left, 47 in.; net weight, approximately 6,500 lb.



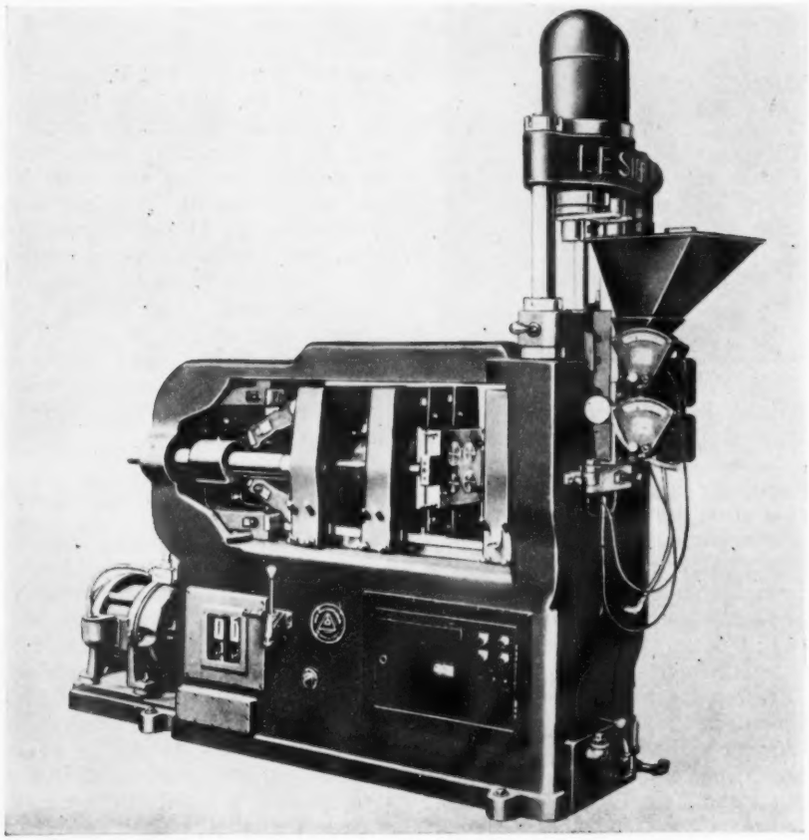
Lester LPM Full Automatic Injection Molding Machines

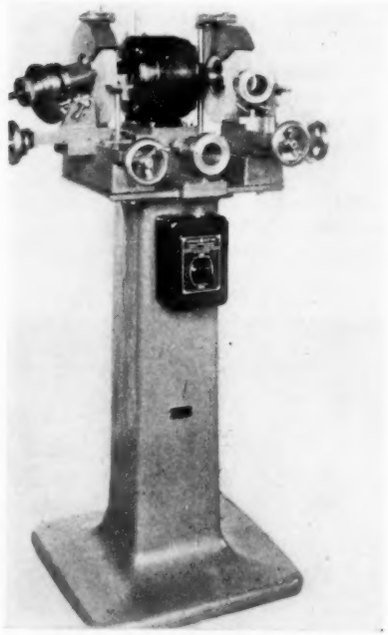
The Lester-designed LPM full automatic injection molding machines for thermo-plastic materials, offered by Index Machinery Corp., 49 Central Ave., Cincinnati, Ohio, have been improved to increase operating efficiency and to minimize effort on the part of the operator. These machines will operate either automatically or semi-automatically, a single operating lever being provided for semi-automatic operation. Molds are opened and closed by hydraulic pressure applied to a toggle-link mechanism.

A sleeve-type heating cylinder assures uniform heating of the material. The entire heating cylinder assembly swings away from the machine to make it accessible for adjustment. Two automatic temperature controls are provided.

Automatic operations are controlled by three electric time clocks located at the operator's side of the machine. All controls, pushbuttons, time clocks, automatic control switches, hand operation switch and relays are arranged in a control panel which is accessible by opening a door in the side of the machine.

Each machine is a self-contained unit, the base serving as a reservoir for the oil supply. They are built in standard 4, 6 and 8 oz. capacities to produce 50, 60 and 80 lb. of plasticized material per hour. A complete description of the features of these standard machines is included in a recently published bulletin.



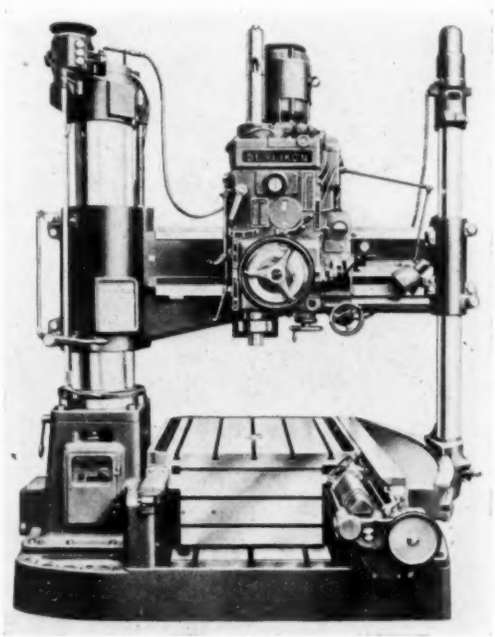


Wells Single-Lip Drill Sharpener

Because of variations in the hardness and quality of metal to be drilled when using single-lip, straight V-fluted oil hole drills for such parts as rifle barrels and machine spindles, different angles may be necessary on the lip, but there is one best combination of angles for each job. That combination can be duplicated on the deep hole drill sharpener developed by Wells Mfg. Co., 55 Pawtucket Ave., Rumford, R. I.

This machine will grind a drill having a maximum diameter of 0.70 in. and is powered with a $\frac{1}{4}$-hp. motor. Floor space required is 18x18 in.; net weight is 275 lb.

"Oerlikon" Radial Drill and Jig Borer



Arm of the "Oerlikon" radial drill, offered in the United States by W. A. Schuyler, 250 West 57th St., New ork, N. Y., is supported by a column which can be moved on arc-shaped ways and locked electrically in any position along these ways. The head can be locked electrically in any position on the arm. Thus, the machine has a spindle that can be repositioned easily, but which at the same time can be changed into a rigid-frame boring machine by pressing a push button. Table measures 47 x 45 in. and moves on ways at right angles to the boring arm, when the latter is clamped in the center position. Thus the machine is suitable for ordinate boring operations, for which it is equipped with scales, verniers and dial gages. It is claimed that spacing of holes can be held accurately within a tolerance of 0.0004 in. in either direction.

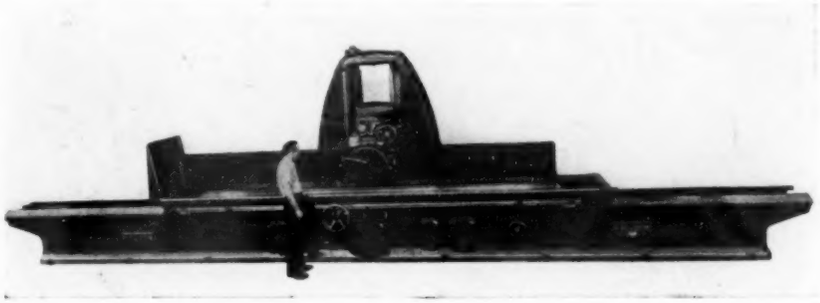
This machine, developed and built by Oerlikon Machine Tool Works, Zuerich-Oerlikon, Switzerland, is provided with 18 spindle speeds, 12 boring feeds and 3 reaming feeds. All controls are centralized, and a number of safety devices prevent damage to the machine. Maximum spindle radius is 48 in. and the machine has capacity to drill $2\frac{3}{4}$ in. holes in cast iron. An $8\frac{1}{2}$ hp. motor drives the spindle.

Mattison 30 x 192-In. Surface Grinder

Bed length of the 30 x 192 precision surface grinder built by Mattison Machine Works, Rockford, Ill., is 36 ft. Wheel clearance above table is 20 in. This is believed to be one of the largest grinders of its type ever built. Installed in a railroad shop, it provides a table surface of sufficient size to accommodate work which before could not be handled satisfactorily. In addition, it permits grinding more pieces per set up on regular size work.

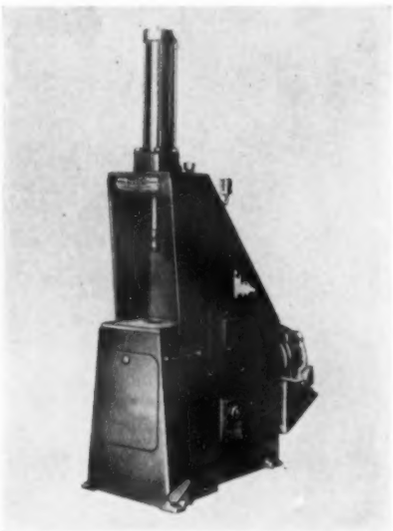
Wheel spindle drive is from a built-in motor with the rotor mounted directly on the wheel spindle and balanced as a unit. Spindle is mounted in a heavy housing which is carried on the horizontal ways of the wheel slide assembly. This wheel slide unit in turn is supported between two vertical columns having large taper-gibbed ways. Table speed ranges up to 100 ft. per min. and is hydraulically operated. Stroke is adjustable to cover any portion of the table.

Transverse movement of the wheel also is hydraulically operated, its action being entirely automatic when grinding. Feed is variable up to $1\frac{3}{4}$ in. at each reversal of the table. Both quick-acting and low-geared cross feeds, with automatic reversal, also can be operated by hand wheel, either for grinding or wheel truing. Operating and adjusting levers, hand wheels and electric pushbuttons are concentrated on the front of the machine within convenient reach of the operator. Raising the wheel from the work is done electrically, the controlling pushbutton being located in the end of the clutch lever. Final adjustment for grinding is made by hand wheel and stop with micrometer graduations of 0.0001 in. Reversing of the wheel slide traverse is accomplished automatically, both on hand and hydraulic feeds, by two dogs on a circular disk.



Nixon Type V and VG Hydraulic Presses

The Nixon Gear & Machine Co., Inc., Syracuse, N. Y., has announced the development of a line of vertical hydraulic presses suitable for general-purpose broaching. Base and frame of these presses are of welded construction, the oil tanks being built into the base. Drive to the hydraulic pump from the electric motor is through a flexible coupling. Work plate is removable for mounting fixtures. Both hand lever and pedal control is provided.



These presses are available in 2, 3 and 5 ton capacities, each with strokes of 12, 18, 24 or 30 in. Maximum pressing speed is 30 ft. per min., while the return speed is 60 ft. per

min. Work plate measures 13 x 11, and this plate has a $2\frac{3}{4}$ in. clearance hole for the broach. Height from floor to work plate is 36 or 40 in., depending on the size of the press.

Linley Vertical Milling Machine

The high-speed vertical bench miller developed by Linley Bros. Co., 12 Montauk St., Bridgeport, Conn., and previously described (*AM*—Vol. 82, page 665), now is available mounted on a cabinet base. Shelves are arranged in the cabinet for storing tools. Table of this machine measures $5\frac{1}{2}$ x $14\frac{1}{2}$ in. and has a 10 in. longitudinal travel. Crosswise travel of the table is 5 in.

Specifications: Maximum distance from top of table to end of spindle, 9 in.; movement of sliding head, 8 in.; spindle travel, 3 in.; distance from center of spindle to column ways, $5\frac{3}{4}$ in.; range of spindle speeds, 275–4,250 r.p.m.; collet capacity, $\frac{1}{2}$ in.; height over pulleys, 61 in.; floor space, 20 x $21\frac{1}{2}$ in.; shipping weight, 700 lb.

S-L Metal-Cutting Improved Jig Shear

Intricate compound curves and shapes in No. 18 gage mild steel, or its equivalent in soft materials, can be cut with a smooth edge which requires no filing with the S-L metal-cutting jig shear offered by the St. Louis Tool Co., 2319 N. Ninth St., St. Louis, Mo. This unit has a cast semi-steel frame

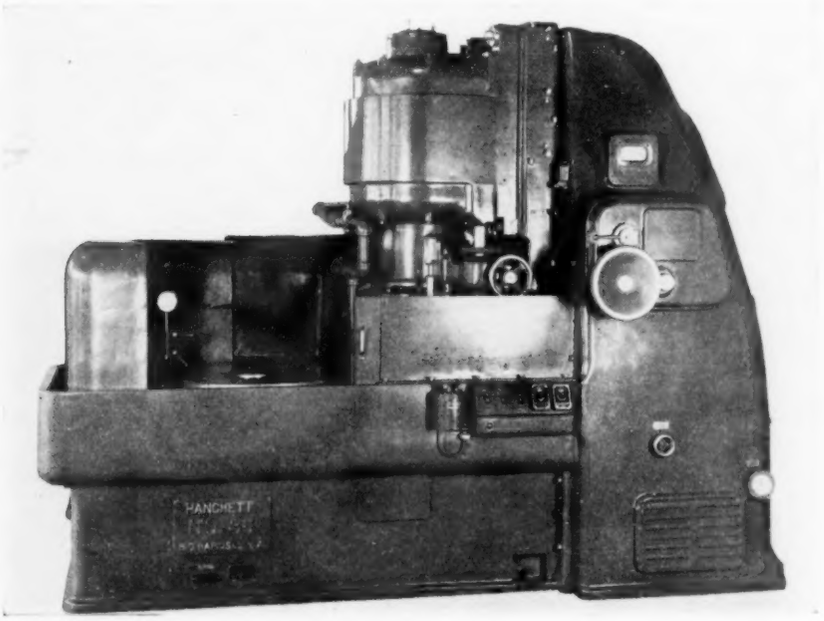
on which is a rubber-mounted $\frac{1}{4}$ hp. G.E. motor which drives the steel shear blade through an arrangement of cam and crosshead. The lower shear blade is fixed on a hand-operated cam and can be retracted below the table surface for making inside closed cuts. The tool will cut radiuses as small as $\frac{3}{4}$ in. Cutter blades are double edged and reversible. Throat opening is 10 in. and the machine weighs 75 lb. Cutter speed is 1,750 r.p.m.

"Rapiduction Junior" No. 541 Bolt Threader

The Oster Mfg. Co., 2057 E. 61st Place, Cleveland, O., has developed the "Rapiduction Junior" No. 541 bolt threader for a wide range of threading operations on bolts up to $1\frac{1}{4}$ in. in diameter. When stripped of die head and vise carriage, the machine can be adapted for chamfering, drilling, reaming, boring, tapping and similar operations. Powered with a constant speed 2-hp., 1,800-r.p.m. motor, the machine has eight spindle speeds, ranging from 27 to 386 r.p.m. Vise is of the open type and has a travel of 10 in. Die head is of the rotary type and is adjustable for over or undersize threads. The machine is 41 in. long, 21 in. wide, and $48\frac{1}{2}$ in. high. Net weight is 750 lb. A companion machine, the No. 542, has capacity for up to $1\frac{1}{2}$ in. diameter stock.

Hanchett No. 36 Rotary Grinder

Horizontal slide, on which the rotary work table of the No. 36 surface grinder offered by Hanchett Mfg. Co., Big Rapids, Mich., is mounted, has power rapid traverse forward and back from the grinding wheel. Speed of work table is infinitely adjustable from 6 to 36 r.p.m. It is supported on a flat circular way extending to the outside diameter of the magnetic chuck. The Walker magnetic chuck is 30 or 36 in. in diameter, depend-



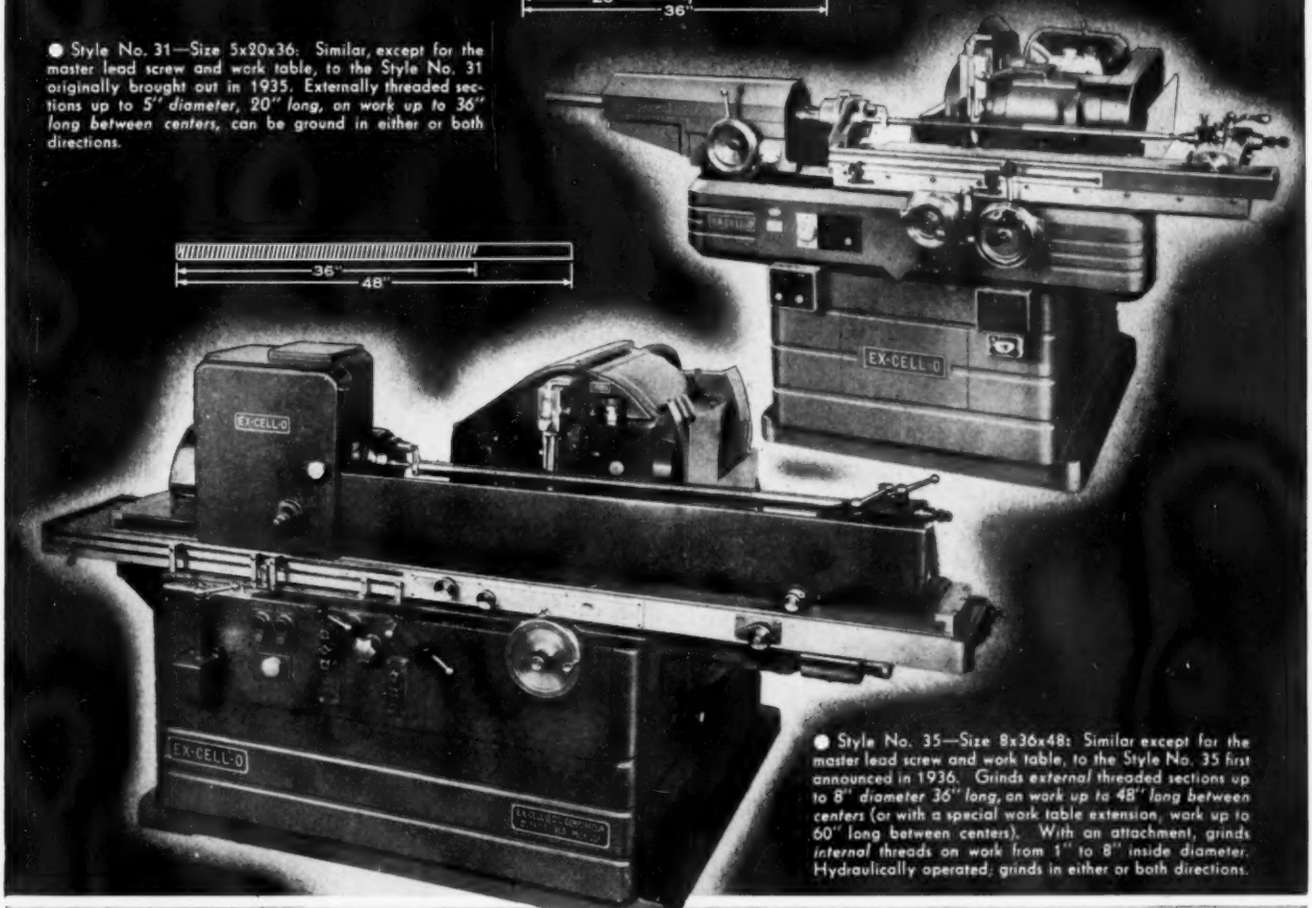
● FOR GRINDING LONG THREADED PARTS

Long threaded parts, such as lead, locating, adjusting and feeding screws, crank and cam shafts, landing gear strut parts, pipe and staybolt taps, drilling adaptors and many similar parts used in the automobile, aircraft, oil well drilling, machine and cutting tool industries are ground on Ex-Cell-O Precision Thread Grinders especially designed for handling long work.

You no longer need to scrap threaded parts because, after many expensive machining operations, they have been distorted in heat treatment. With an Ex-Cell-O Precision Thread Grinder you finish grind the threads *after hardening*, and *keep* extreme accuracy of thread form, lead, and pitch diameter. On long parts particularly, this results in great savings in manufacture, as well as better performance of the parts in actual operation.

Ex-Cell-O offers two machines, in two work ranges, for precision grinding long work. Let us show you how the accuracy of your parts can be increased, and their life and efficiency improved.

● Style No. 31—Size 5x20x36: Similar, except for the master lead screw and work table, to the Style No. 31 originally brought out in 1935. Externally threaded sections up to 5" *diameter*, 20" *long*, on work up to 36" *long between centers*, can be ground in either or both directions.



● Style No. 35—Size 8x36x48: Similar except for the master lead screw and work table, to the Style No. 35 first announced in 1936. Grinds *external* threaded sections up to 8" *diameter 36" long, on work up to 48" long between centers* (or with a special work table extension, work up to 60" long between centers). With an attachment, grinds *internal* threads on work from 1" to 8" inside diameter. Hydraulically operated; grinds in either or both directions.

EX-CELL-O

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DRILL JIG BUSHINGS. GRINDING SPINDLES HYDRAULIC POWER UNITS. PRECISION BORING AND FACING MACHINES. PRECISION THREAD GRINDERS. COUNTERBORES. BROACHES. CARBIDE TOOL GRINDERS. CARBOLOY TIPPED TOOLS. SPECIAL HIGH PRODUCTION MACHINES. GROUND FORM TOOLS. PRECISION PARTS. MILLING CUTTERS

EX-CELL-O CORPORATION, 1224 Oakman Blvd., Detroit, Mich.
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Name_____ Title_____
Company _____
Address _____

ing on the diameter of table selected. Using a 4-in. high cylindrical wheel, work 14 in. high can be ground. When a 6-in. high segmental wheel is used, work 11-in. high can be placed on the magnetic chuck.

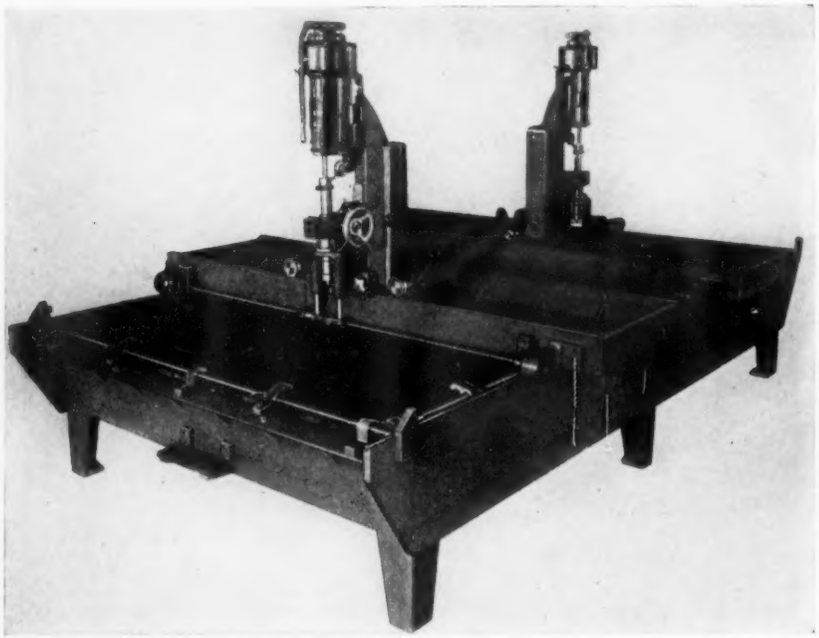
Wheelhead feed is by hand or power and is variable from 0.004 to 0.080 in. per min. Feed wheel is graduated in steps of 0.0001 in. A separate motor is used for rapid raising and lowering of the wheel head and is interlocked with the wheel feed. Wheel is driven by means of a 25 hp., 700 r.p.m. motor mounted on the wheel spindle. Overall dimensions are: length, 128 in.; width, 68 in.; height, 103 in. Net weight is 15,000 lb.

G.E. Half-Cycle Electric Welder

Developed to replace soldering operations in the manufacture of small assemblies, such as radio sets, meters, control devices, signal equipment and business machines, the ½-cycle Thyratron-controlled resistance welder announced by General Electric Co., Schenectady, N. Y., has a dial for regulating the heat by the phase-shifting method. Amount of heat is determined accurately by the duration of current flow; maximum heat being obtained with a current duration of

slightly more than 1/120 sec. Tongs are used in welding solid or stranded wires to terminals. Similarly, a suitable bench unit can be used to weld small studs to flat surfaces.

Avey "Aircraft" Sheet Drill

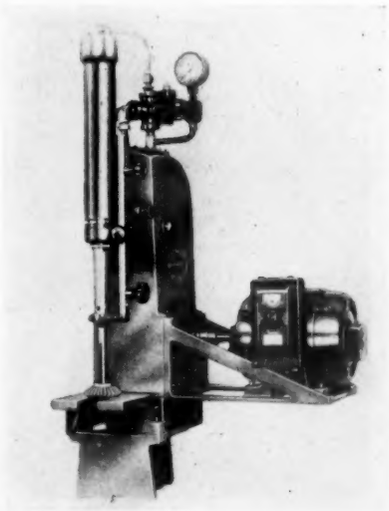


The "Aircraft" sheet drilling machine announced by the Avey Drilling Machine Co., 118 W. Second St., Cincinnati, Ohio, is so designed that the size of the base and carriages can be varied to suit requirements. Drilling units shown are of the No. 1 size, Type MA-6, for holes up to ½ in. in duralium, but units of the No. 2 or No. 3 size can be substituted where larger capacity is required or where iron or steel sheets are to be drilled. Platen is of 2-in. thick hardwood. For other classes of work, this platen can be made of metal.

Each drilling head is equipped with a suspended bushing plate to guide the drill close to the surface of the material. Sheet clamps are provided to hold the material in position. Both the cross carriages and longitudinal carriages are suspended on hardened rollers which run on heat-treated ways. Clamps hold both carriages in drilling position. Two drilling units are mounted on the bed of this machine, in order that holes may be drilled in each end of the stack of sheets simultaneously. The machine shown will drill a 2-in. thick stacking of 128 x 73 in. duralium sheets.

Greenerd 1½-Ton Bench-Type Press

This 1½-ton self-contained, bench-type hydraulic arbor press, developed by Greenerd Arbor Press Co., P. O. Box 415, Nashua, N. H., has an 8 x 8 in. machined work table with a 2-in slot. Pump and control valve are mounted in the oil sump, which



is cast as part of the main housing. Motor is directly coupled to the pump shaft. Pressure may be set from 50 to 3,000 lb. These presses are available for mounting on work benches or pedestals and will take a 12-in. diameter work piece.

South Bend Improved Pedestal Motor Drive

Motor and driving mechanism are mounted on the pedestal of the improved adjustable motor drive offered by South Bend Lathe Works, 426 E. Madison St., South Bend, Ind., for 9–16 in. swing cone-drive engine lathes. A double arm adjustable tension brace locks the pedestal unit in

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Write for new bulletins illustrating and describing the latest developments and improvements in metal working machines.

General view showing battery of Niagara Presses and Shears in the metal working department of one of America's largest Airplane manufacturers.

Photo courtesy of Curtiss Aeroplane Division of Curtiss-Wright Corporation

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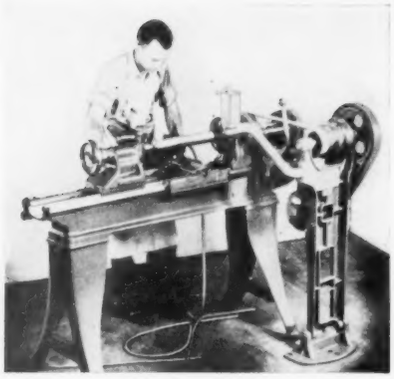


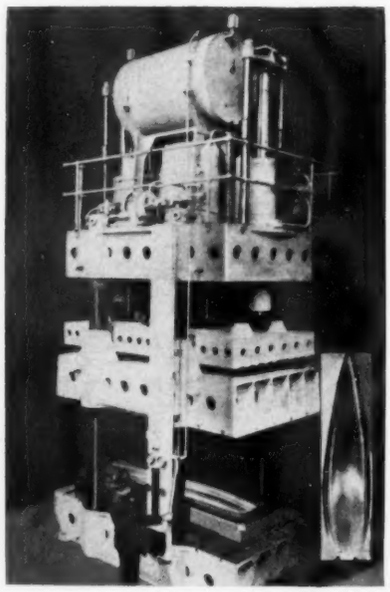
position when the lathe is in operation. Two turnbuckles, one on each arm, permit adjustment of the belt. Pulling a lever forward unlocks the tension brace, permitting the pedestal to tilt forward and release the belt tension.

Laidlaw Model 110 Bandsaw Welder

Bandsaw blades ranging from 0.010 to 0.050 in. and from $\frac{1}{8}$ to $\frac{1}{2}$ in. wide can be butt-welded in this Model 110 Jr. welder announced by William Laidlaw, Inc., Belmont, N. Y. This unit draws a maximum of approximately 15 amp. at 110 volts, and may be plugged into any light socket. A "Senior" model has capacity for $\frac{1}{4}$ to 1 in. wide blades.

Lake Erie 660-Ton Hydraulic Presses

A battery of five special 660-ton hydraulic presses has been built by Lake Erie Engineering Corp., 268 Perry St., Buffalo, N. Y., for a large manufacturer of airplanes. Each of these presses is a self-contained unit, 26 ft. high and weighing 165,000 lb. Controls and gages are centralized for convenient operation and accurate regulation of working pressures for the various operations involved in blanking, drawing and forming a wide variety of aircraft parts. Rotary-vane type pumps are used.



"Aminco-Brenner" Gage Measures Nickel Plate

The "Aminco-Brenner" Magne-Gage offered by the American Instrument Co., 8010-8020 Georgia Ave., Silver Spring, Md., has three different applications: (1) measuring the thickness of nickel coatings on non-magnetic base metals; (2) measuring the thickness of non-magnetic coatings such as copper, zinc, cadmium, tin, chromium, paint and enamel, on iron or steel; and (3) for measuring the thickness of polished nickel coatings on iron or steel. Calibration of each instrument is by the National Bureau of Standards, whose calibration curves are supplied with each instrument.

Measurement of the thickness of coatings on metals with this instrument is based on the principle that the force of attraction between a permanent bar magnet and a nickel coating on a non-magnetic base material is practically proportional to the thickness of the coating. The force

of attraction, which is measured by the torsion of a spiral spring, is indicated on the dial and these readings are converted into thickness measurements by reference to a calibration chart. Any non-magnetic material placed between the magnet and a magnetic base metal decreases the magnetic attraction to an extent that depends upon the thickness of the intervening layer. Thus, if the bar magnet is calibrated with non-magnetic coatings it can be used to determine the thickness of other non-magnetic coatings.

Commonwealth Offers Glass-Insulated Welder

Control panel provides a range of from 20 to 120 amp. on the Model 120-UL continuous-duty arc welder developed by the Commonwealth Mfg. Corp., 4208 Davis Lane, Cincinnati, Ohio. Transformer and reactance coils are wound with double Vitrotex glass-insulated copper magnet wire which is not affected by high temperatures, age, moisture, oil, corrosive acid or alkali fumes. The unit can be connected to either 110 or 220 volt supply circuits. The machine is 24 in. high, 20 in. wide and $25\frac{1}{2}$ in. deep. Shipping weight, complete with accessories and equipment, is 200 lb.

LeBLOND *presents*

THE FIRST REALLY UNIVERSAL

CUTTER—GRINDER

new **VERSATILITY!**
new **FLEXIBILITY!**
new **QUICK SET UP!**

The NEW
LeBlond
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No. 3

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1. *New Universal Wheel Head:* with three independent and coordinated planes of full circle movement achieves a new versatility and flexibility.
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3. *Selective Speeds to Spindle:* Four speeds—3100, 4000, 5100, and 6500 r.p.m.—provide proper latitude for every work requirement.
4. *Universal Table Position:* The special construction of the table makes possible the placing of the work to the grinder wheel in any position or angle.
5. *Operation of Feeds:* By means of advanced designing and engineering, feeds are operated smoothly, precisely, and quickly.
6. *The Work Head:* Independently motored with a variable speed driving unit.
7. *Long Life Construction:* Characteristic LeBlond construction has been carefully carried out in the No. 3 for longer life under rigorous use.

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Bulletin complete with illustrations, construction details, and specifications will be sent free upon request. Send for your copy now!

THE R. K. LeBLOND MACHINE TOOL CO.

CINCINNATI, OHIO

Murex "Fillex" Welding Electrode

Designed for fillet welding and other downhand work, the Murex "Fillex" heavy-coated welding electrode announced by Metal & Thermit Corp., 120 Broadway, New York, N. Y., will not undercut at high amperages and is said to permit welding operators to increase output appreciably. Welds made with this electrode have physical properties meeting the American Welding Society's specifications for Grade 10 filler metal.

TRADE PUBLICATIONS

BOLTS A line of screws, bolts and nuts is described in Catalog No. 38, now being distributed by The Wasmer Bolt & Nut Co., 13000 Athens Ave., Cleveland, Ohio.

COMPRESSOR The Sullivan Machinery Co., Michigan City, Ind., is distributing Bulletin No. A-22, which describes and illustrates "Unitair" air compressors.

CORROSION The American Society for Testing Materials, 360 S. Broad St., Philadelphia, Pa., has published a 24-page illustrated booklet entitled "Symposium on Protecting Metals Against Corrosion."

DRILL The Buffalo Forge Co., 448 Broadway, Buffalo, N. Y., offers an illustrated bulletin, No. 3122, describing the No. 16 power-feed drill.

ELECTRIC HAMMER The "Do-All" combination electric drill and hammer is described in Bulletin No. 385, published by the Wodack Electric Tool Corp., 4627–29 West Huron St., Chicago, Ill.

ENAMEL The Porcelain Enamel Institute, 612 North Michigan Ave., Chicago, Ill., has published a revised edition of the handbook entitled "Test for Acid Resistance of Porcelain Enamels."

ENGINE Bulletin No. S-500-B35, now being distributed by the Worthington Pump & Machinery Corp., Harrison, N. J., discusses features of Type BB diesel engines.

FLOORING The Flexrock Co., 800 N. Delaware Ave., Philadelphia, Pa., has published a folder describing a recently developed non-slip floor wax.

FLUX Krembs & Co., 669 W. Ohio St., Chicago, Ill., has published a chart tabulating the uses and properties of "Fluxine" welding and soldering fluxes.

FUSES Folder No. F-8450, issued by the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., describes the "De-Ion" type high-voltage power fuses.

GEARS Catalog No. S-59, now being distributed by the Charles Bond Co., 617–23 Arch St., Philadelphia, Pa., lists a line of gears, sprockets and speed reducers.

GRINDER A line of "Yankee" twist drill grinders is described in Bulletin No. 9-38, offered by the Covel Mfg. Co., Benton Harbor, Mich.

HAND TOOLS Catalog No. 30, offered by The Owatonna Tool Co., Owatonna, Minn., contains 144 pages of specifications concerning a complete line of hand tools.

INSTRUMENTS Catalog No. 1060 D, published by C. J. Tagliabue Mfg. Co., Park and Nostrand Aves., Brooklyn, N. Y., contains 64 pages of illustrations and data regarding the "TAG" line of indicating, recording and controlling instruments.

BE SURE TO VISIT OUR BOOTH C-238 AT NATIONAL METAL CONGRESS, DETROIT, OCT. 17-21.

INSTRUMENTS Bulletin No. M-382, released by the Thwing-Albert Instrument Co., 3339–41 Lancaster Ave., Philadelphia, Pa., describes a line of temperature measuring and controlling instruments.

LIGHTING Catalog Section No. 61-153, released by the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., gives data concerning "Locklite" reflectors and hoods.

LIGHTNING ARRESTERS Types MP and IC d.c. lightning arresters are described in Catalog Section No. 38-260, released by the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

LUBRICATION Proper lubrication of ball and roller bearings is discussed in a 44-page booklet published by The Texas Company, 135 East 42nd St., New York, N. Y.

MATERIALS HANDLING A line of industrial trucks, cars and turntables is described in Bulletin No. 228, offered by the Whiting Corporation, Harvey, Ill.

MATERIALS HANDLING The Cleveland Tramrail overhead materials handling system is illustrated in Folder No. G4-38 released by the Cleveland Crane & Engineering Co., Wickliffe, Ohio.

MASONRY FASTENINGS Catalog No. 38 entitled "A Better Anchorage for Bolts and Screws," issued by The Rawlplug Co., 98 Lafayette St., New York, N. Y., describes different types of anchors and accessories for use in masonry and other materials.

PHYSICS Circular No. 35, a reprint from the Journal of Engineering Education, June, 1938, entitled "Physical Theory in Engineering Language," is being distributed by the Engineering Experiment Station, Ohio State University, Columbus, Ohio.

PIPE TOOLS Pipe tools are described in Catalog No. 438 issued by Beaver Pipe Tools, Inc., Warren, Ohio.

PORTABLE TOOLS A comprehensive line of portable electric tools is listed in Bulletin No. 372, offered by the Wodack Electric Tool Corp., 4627–29 W. Huron St., Chicago, Ill.

POWER A 125-page report entitled "Power Requirements in Electrochemical, Electrometallurgical and Allied Industries" has been published by the Federal Power Commission, Washington, D. C. Copies may be obtained from the Commission. Price, $1 each.

PRECISION MEASURING Pratt & Whitney Div., Niles-Bement-Pond Co., Hartford, Conn., has issued Circular No. 442 describing a new "Supermicrometer."

PUMPS A new price list, Form L14D, applying to the boiler service equipment described in Bulletin No. 260-B14B, has been issued by the turbine pump division of Roots-Connersville Blower Corp., Connersville, Ind.

RECTIFIER Data Sheet No. 27-450, released by the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., describes "Rectox" rectifiers for cathodic protection of structures subject to natural corrosion-producing galvanic action.

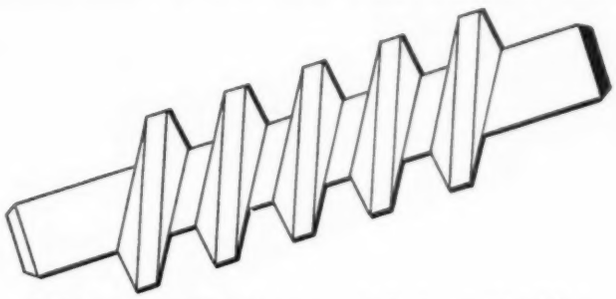
SPECIAL TOOLS Catalog No. 12, supplementing regular Catalog No. 11, describes the "Midget" milling cutters manufactured by the Severance Tool Mfg. Co., 1520 E. Genesee Ave., Saginaw, Mich.

STEEL Certified steels and allied products are listed in a pocket-size stock list offered by Joseph T. Ryerson & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.

TELEMETERING The "Metameter" system of telemetering is de-

Inland Created Ledloy to Save Machining Costs

—It Saved $47.85 Per Ton On This Part



This case carburized worm shaft for a threshing machine was formerly made of X-1314 steel. Now it's cold finished Inland Ledloy, with reduced machining costs of $47.85 per ton of steel used.

If your product requires extensive machining operations, why not change to Inland Ledloy? Ledloy has all the desirable physical properties of standard open hearth steel plus remarkable machinability. Write for complete information and case studies showing savings reported by other manufacturers.

INLAND STEEL CO.

38 South Dearborn Street, Chicago

Sheets Strip Tin Plate Bars Plates Reinforcing Bars Floor Plates Structurals Piling Rails Track Accessories

scribed in Bulletin No. 515, released by the Bristol Co., S. Main St., Waterbury, Conn.

VACUUM CLEANER Bulletin No. 119, released by The Spencer Turbine Co., Hartford, Conn., describes a new ¾-hp. industrial cleaner.

WAGE-HOUR LAW The National Standard Parts Association, 1420 United Artists Bldg., Detroit, Mich., is issuing a series of bulletins discussing interpretation and procedure under the new Labor Standards Act.

WELDING Data Sheet No. 18-345, issued by the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., announces the "Weld-O-Trol" electronic power switch for welding transformers.

WELDING Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., lists causes and cures for common troubles met by welders in booklet No. B-2150-A.

NEW BOOKS

ALUMINUM. *By Douglas B. Hobbs, Aluminum Company of America. 295 pages, 6x9 in. Clothboard binding. Indexed and illustrated. Published by the Bruce Publishing Co., 524-544 N. Milwaukee St., Milwaukee, Wis. Price* $3.00.

Designed for the student in high school and vocational schools, this volume is divided into two parts. Part I covers the mining of bauxite, the manufacture of aluminum, fabrication of basic aluminum commodities and principal applications of aluminum and its alloys. Part II contains 25 projects to be made by the student in the school workshop.

Throughout the text an effort has been made to keep before the student the basic characteristics of the metal without confusing him with too much detail or with technical metallurgy which is reserved for more advanced studies. Workshop projects have been graded with a view to increasing their complexity as the student advances.

•

ELEMENTS OF FERROUS METALLURGY. *Second Edition. By Joseph L. Rosenholtz, Rensselaer Polytechnic Institute, and Joseph F. Oesterle, University of Wisconsin. 258 pages, for* 5¾ x 9 in. *Clothboard binding. Indexed and illustrated. Published by John Wiley & Sons, 440 Fourth Ave., New York, N. Y. Price* $3.00.

Primarily intended as a textbook for engineering students other than those in metallurgy, this volume presents a relatively short work on a large subject. The authors trace the processing of ferrous materials from the ore to the finished cast, forged or rolled product. In this second edition, the subject matter has been brought up to date in recognition of the new practices and new alloys that have been developed and the modern theories of metallurgy that have been advanced. In addition, the original material has been carefully revised, better to adapt it to the needs of classroom work.

•

THE ENCYCLOPEDIA OF WELDING. *Ninth edition. Compiled and edited by L. B. McKenzie and H. S. Card, editorial staff of the Welding Engineer. Re-edited by Stewart Plumley. 638 pages,* 5¾ x 8¾ *in. Imitation leather binding. Illustrated. Published by the Welding Engineer Publishing Company, 608 S. Dearborn St., Chicago, Ill.*

So great has been the progress in the art of welding that a new edition was necessary to bring this encyclopedia up to date. To a large extent the volume has been completely rewritten and the arrangement altered

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STRONGER JOINTS
AN HOUR
SOLID RIVETS FED AND SET
. . . AUTOMATICALLY.
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HELD TIGHTLY TOGETHER
WHILE THEY ARE BEING
←RIVETED.
"R" Machine sets up to 1/4" dia. x
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1500 an hour or more depending on
the job.
"BR" Machine sets up to 1/16" dia. x
1/2" long solid rivets at rate up to
3200 an hour. Write for Bulletins
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RIVITOR

so that it may be used like a dictionary with alphabetic reference to specific information.

Its purpose, however, has the same objective as that of the first edition published in 1921, namely to afford a specialized handbook of reference to users of welding and those who wished to study the advantages of this process. As it now stands, the volume represents a collection of basic data to which many men have had a hand in contributing. The book gives consideration to the many kinds of gas, arc and resistant welding, including special applications for specific types of work and material. Particular attention is paid in this edition to the use of coated electrodes which have developed so rapidly during the past six years.

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THE STRUCTURE OF STEEL. *By Eric N. Simmons and Edwin Gregory, chief metallurgist, Parkgate Iron & Steel Company, Ltd.* 115 *pages,* 4⅞ x 7¼ *in. Clothboard binding. Indexed and illustrated. Published by Prentice-Hall, Inc., 70 Fifth Ave., New York, N. Y. Price* $2.00.

In his work of editing the *Edgar Allen News,* Mr. Simmons became convinced that there was a need for a treatise to explain the structure of steel to the layman. He found that most books were written either by experts for experts, or by professors for students. In preparing this volume, he had in mind the people who buy, sell, study, manipulate and, in short, have to do with steel and who seek an insight into its structure because they need this information in their daily jobs.

The result is a simple exposition of the subject which states briefly the important principles underlying the use of steel. It is not a so-called popular presentation although the author's aim is to aid the reader by analogies and non-technical explanations. He freely admits that this treatment, in his original series, frequently led him into misstatements of fact, but in book form, these have been removed by the collaboration of Dr. Gregory.

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FOREMANSHIP AND SUPERVISION. *Second Edition. By Frank Cushman, consultant in vocational education, U. S. Department of the Interior.* 286 *pages,* 5 x 7¼ *in. Clothboard binding. Indexed and illustrated. Published by John Wiley & Sons, 440 Fourth Ave., New York, N. Y. Price,* $2.50.

All methods of neutralizing the influence of those who would stir up discontent in the ranks of labor are of little effect unless the foreman has an understanding of the problems of management, and is willing to lend management his loyalty. For this reason, Mr. Cushman's revision of foremanship training by means of the conference procedure is timely and important.

The volume is a practical guide to the conduct of foremen's meetings. It discusses where and when they shall be held, and the subjects to be considered. It defines the functions of foremanship and the best ways of educating individuals to fill these functions.

In the revised edition the author has included new material based on ten years of practical use of the conference method of conducting educational programs.

He has added two new chapters. One, on the selection of chart headings, gives illustrations to make the subject of chart or blackboard work more easily understandable. The second,, on "Some Fundamental Principles of good Supervision", offers a practical basis for the adaptation of the conference procedure to the improvement of vocational training.

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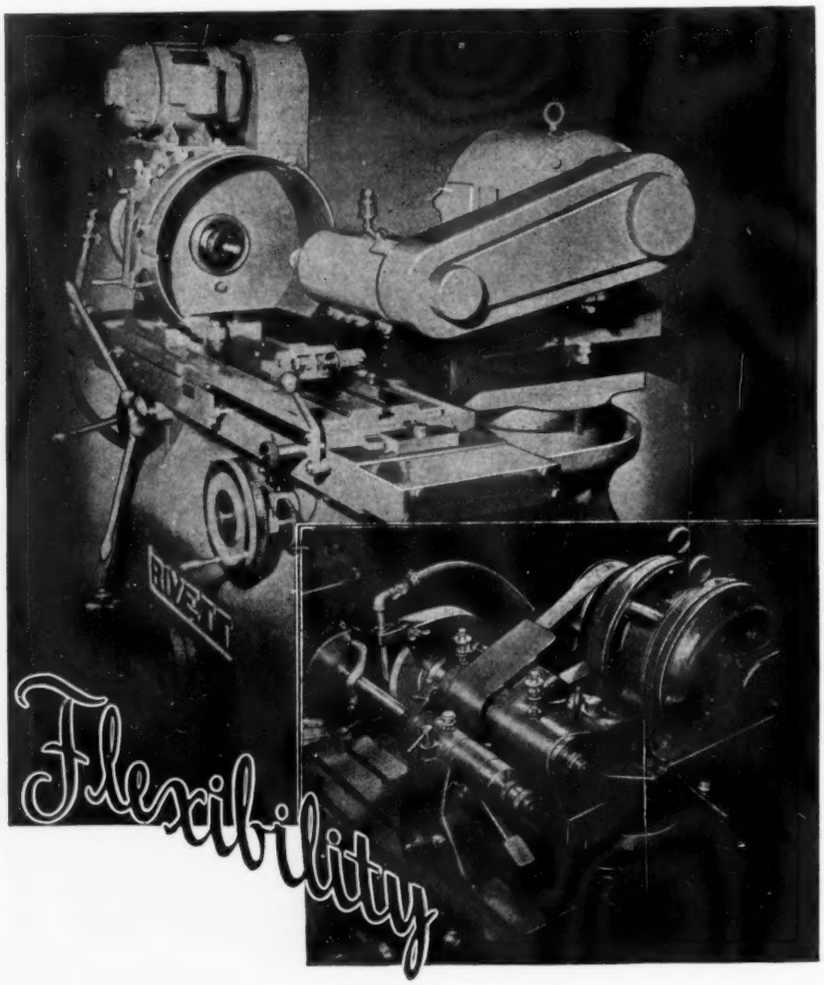
STEELS FOR THE USER. *By R. T. Rolfe, chief metallurgist, W. H. Allen, Sons & Co., Ltd.* 280 *pages,* 5¼ x 8¼ *in. Clothboard binding. Indexed and illustrated. Published by the Chemical Publishing Company,* 148 *Lafayette St., New York, N. Y. Price* $8.50.

There are many books on steel written for the student and the specialist. The user or engineer who seeks to apply steels to his own product, often finds that a search for the useful information he requires necessitates wading through much material of little value to him. The purpose of this volume is to eliminate such extraneous information and to present a book written specifically for the user of steels.

The first edition appeared in England and was based on articles written for *The Iron and Steel Industry* during the years 1934–37. Letters and requests for these articles in permanent form led to the publication of this work. In it the author attempts to bridge the gap between science and practice for carbon steels in industry. If there can be any criticism of his handling of the subject, it is due to lack of emphasis on the alloy steels which raise important problems concerning their selection.

The general approach is from the standpoint of mechanical quality and how to obtain it, a subject of prime interest to the user. This angle is presented as to the effect of composition and as to subsequent heat-treatment, designed to fit the steel for specific uses.



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Government Participation In Handling Labor Relations

RUSSELL L. GREENMAN
Assistant, Department of Manufacture Chamber of Commerce of the United States

Ten cents for cooperation in the field of labor relations for every dollar spent for coercion. That is the approximate ratio between current appropriations for the United States Conciliation Service and the appropriations for the National Labor Relations Board. These are the two main federal agencies concerned with the collective bargaining problems of industry in general.

To be sure, the Conciliation Service and the Labor Relations Board have quite different functions. The service operates on a wholly voluntary basis. Its object is to prevent labor disputes and, when strikes have already been called, to bring about the most expeditious and most amicable settlements. Its staff members intervene in labor controversies only at the request of one of the parties concerned and continue to exercise their good offices only so long as both parties desire.

The Labor Relations Board, of course, operates on an entirely different basis. Its task is that of compulsion and punishment.

In all fairness to the board, however, it must be realized that Congress gave it a definite mandate. One of the stated policies of the Labor Relations Act is to promote collective bargaining. The board has obviously striven to fulfill that purpose according to its lights. But it does not necessarily follow, by any means, that the act itself was wisely conceived, that all of the board's decisions have been beyond reproach, that its agents have always acted without bias, or that its orders in every instance have facilitated the process of genuine collective bargaining.

Within the last three months the board has accused employers of continuing to fight against organized labor. One member even expressed the view that "deliberate, systematic and ruthless attempts" were still be-

ing made by employers to frustrate union activity.

Is it true that in general employers have deliberately been violating the Labor Relations Act? My belief is that a substantial proportion of the charges of violating the act can be attributed, not to any deliberate intention on the part of employers, but rather to the uncertainties and ambiguities of the act itself.

Before any employer can comply fully with the Labor Relations Act he naturally must understand what it means, what its objects are, and how the board, itself, interprets these objects. One of these is to promote collective bargaining. But should an employer undertake to promote collective bargaining, with a sincere intention to carry out the spirit of the act, he thereby would run the risk of being held in violation of the law. In fact, employers have been held guilty of an unfair labor practice when, without undertaking to ascertain the desires of their employees, they readily acquiesced in the demands of labor organizations claiming to represent the majority at the same time that rival unions were contesting for recognition. Moreover, as is well known, the board has persistently refused to let an employer take the initiative in seeking board determination as to which of two rival labor organizations actually represents the majority of his employees. There is nothing in the law which prohibits the board from taking such action.

Another major purpose of the act is to diminish the causes of labor disputes. But members of the board have taken the position that strikes are not necessarily an evil to be avoided.

The board has even gone so far as to order an employer to reinstate a group of union employees who had admittedly engaged in violence during a strike. In so doing it took the position that the employer had shown anti-union discrimination in giving reemployment to some non-union workers who had used the same tactics as had been directed against them by the instigators of the strike.

What then is the real object of the Labor Relations Act? This question was asked anew of the author of the Act just two weeks ago in the United States Senate. In reply, Senator Wagner asserted: "The Labor Relations Act was passed for the purpose of giving the workers an opportunity to organize and through their organization to control the price which is to be paid for their services." Evidently, Senator Wagner now construes the act, not as a device for equalizing the bargaining power of employers and employees, but as a means for enabling labor organizations to dictate the terms of employment.

It is not quite fair to say that the act is being administered in an utterly one-sided way, for employers are given some privileges. One of these is the opportunity of consulting the board's regional directors about their obligations under the statute. Apparently many employers have taken advantage of this opportunity and profited thereby. The board points with pride to an impressive record in the informal settlement of labor disputes. Up to December, 1937, for example, nearly 60 per cent of the cases involving complaints of unfair labor practices were settled by agreement of the parties. In addition, nearly 15 per cent of the complaints were dismissed by the board or its regional directors without formal action and about 20 per cent of the complaints were withdrawn. Only 5 per cent of the issuance of board decisions and cease and desist orders. Of course, no one can even guess what proportion of the informal settlements were of the shotgun variety.

From a talk before the American Management Association Industrial Relations Conference, February 16, 1938.

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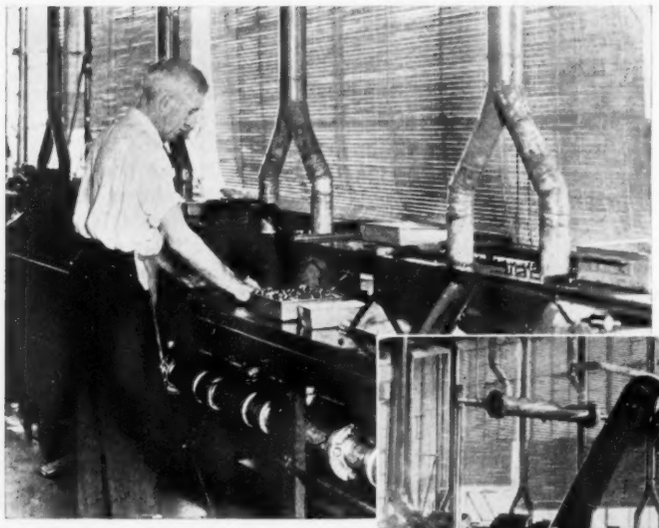
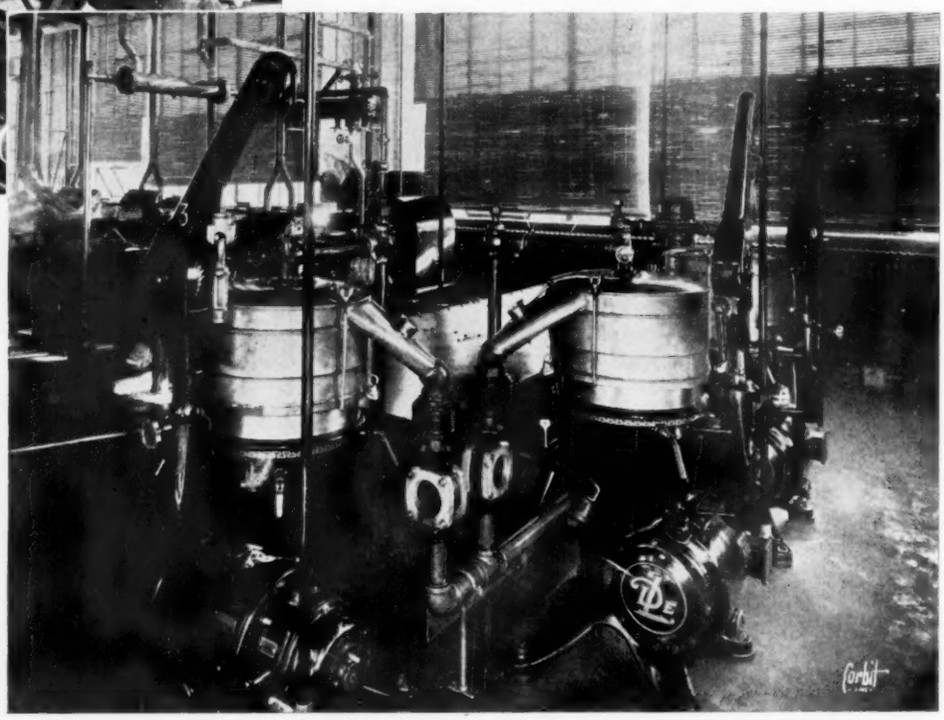


ILLUSTRATION at the left shows bearing washing operation at the Norma-Hoffmann Bearings Corporation, Stamford, Conn., where continuously purified oil "cleans the bearings, instead of washing dirt into them." Below is shown three high-capacity De Laval Oil Purifiers which make it much more economical to use clean oil than to take a chance with that containing impurities.



Norma-Hoffmann has found it pays to wash bearings in clean oil

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